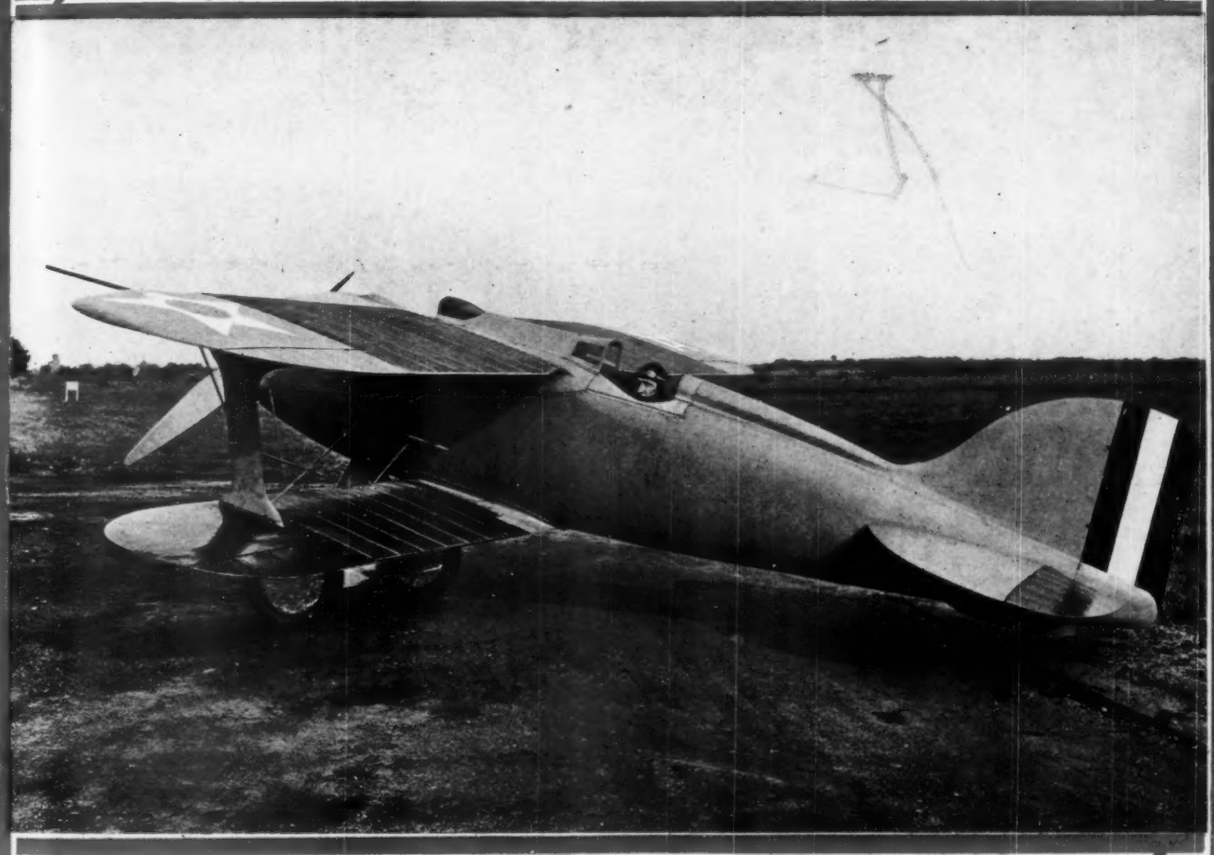
AVIATION

The Oldest American Aeronautical Magazine

SEPTEMBER 28, 1925 Issued Weekly PRICE 10 CENTS



The 1925 Curtiss Racer

VOLUME XIX

NUMBER 13

SPECIAL FEATURES

THE NEW CURTISS RACER

AEROMARINE ENGINE STARTER

MUNICH HOLDS SUCCESSFUL AERO SHOW

OFFICIAL RECORDS ON BOMBING ACCURACY

GARDNER PUBLISHING CO., INC.
HIGHLAND, N. Y.
225 FOURTH AVENUE, NEW YORK

Entered as Second-Class Matter, Nov. 22, 1920, at the Post Office at Highland, N. Y. under Act of March 3, 1879.

SPEED WITH SAFETY

Curtiss

CURTISS CARRIER PIGEON

Let the Operator Keep Faith with the Public

The public demand for the transportation of passengers, mails and express matter by the air route places a definite responsibility upon all those who are studying the problem of air operation.

There seems to be no question that companies now organized will receive the sympathetic support of the public in exact proportion to the judgment, experience and honesty which they exercise in their pioneer operations. The greatest care must be used in organizing along practical and conservative lines. The success or failure of this enterprise will depend largely on two factors, personnel and equipment.

PERSONNEL. The personnel will be found available among that group of airmen produced by the war who are devoting their lives to the application of aviation to civilian needs.

EQUIPMENT. Obviously the Aircraft Operating Companies, not themselves designers or builders, must select their equipment from the best which the aircraft industry can supply.

The Curtiss Aeroplane & Motor Company, the oldest airplane and motor producer in the country, and the organization that has been the creative and productive source of the best military airplanes and motors, has directed its creative energy toward the commercial problem. It was the first company to design, build and test an airplane for the specific requirements of the Air Mail Service. The Curtiss Carrier Pigeon was at once accepted by the Post Office. The expert committee of the National Air Transport, Inc., after a coast-to-coast survey of available equipment, recommended the Curtiss Carrier Pigeon, and the company at once placed an order for a quantity of these machines.

As interchangeability of parts with consequent reduction in cost of maintenance was an important factor in the selection of the Carrier Pigeon by one company, so standardization of airplanes of one type and of one manufacturer by the Post Office and the leading operating companies will make efficient and economical operation possible. The use by all pilots of one type, the standardization of interchangeable spare parts for general distribution from Curtiss stores throughout the country, and the reduced price of planes and parts through centralized quantity production will make the Carrier Pigeon the standard commercial airplane. For "feeder lines" the Curtiss Lark, a smaller prototype of the Pigeon, will shortly be available.

ON TO NEW YORK FOR THE 1925 AIR RACES,
MITCHEL FIELD, L. I. OCTOBER 8TH, 9TH, 10TH; 1925

CURTISS AEROPLANE & MOTOR COMPANY, INC.
GARDEN CITY, N. Y. BUFFALO, N. Y.

SEPTEMBER 28, 1925

AVIATION

VOL. XIX. NO. 13

Published every Monday

CONTENTS

Editorials	381	The Tulsa Air Meet	388
Post Office Air Mail Bids Opened	382	The Munich Aero Show	389
Flight Tests of the New Curtiss Racer	383	The Aeromarine Starter	391
The Ford Reliability Tour	384	Bombing Accuracy	393
President's Air Board Commences Sessions	385	Airports and Airways	397
Shock Absorbers for Flying Boats	386	United States Air Forces	401

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Descriptive Booklet Upon Request

CURTISS AIR STATION
of ATLANTIC CITY, Inc.
ATLANTIC CITY, NEW JERSEY

Scintilla Magneto Co.,Inc.. August 17 1925..
225 West 57th, Street.
New York City N.Y.

Gentlemen:-

In connection with our adoption of the Scintilla Magnetos at this Station as standard ignition equipment on all aeronautical motors in Febuary 1924., I thought that it may be of interest to you to know of the most remarkable performance of these instruments which have been in service since that time.

Since the establishment of this Hangar in 1916 we have used various types and kinds of ignition equipment however none of which has given us one hundred per cent performance such as we are now getting with the use of the Scintilla Magneto.

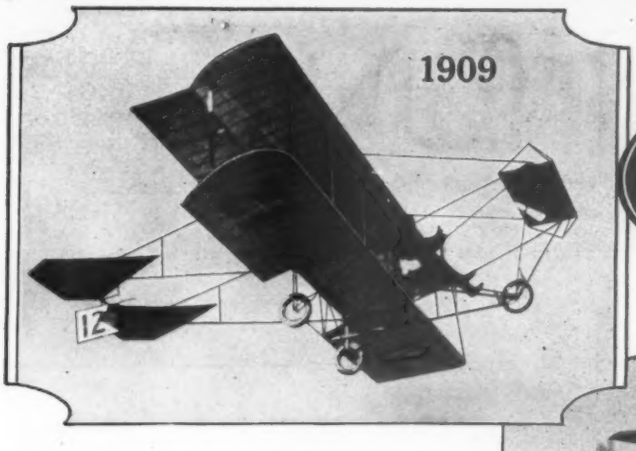
These instruments have performed satisfasterily under all sorts of weather conditions unfavorable to flying such as da ymess from fog, rain, and salt water spray, we are very enthusiastic over their achievements and are glad to reccomend them to any one in need of Better Ignition equipment for any purpose.

Wishing you every success that this most wonderful instrument deserves, Iam,

Very Truly Youre,
Curtiss Air Station of Atlantic City N.J. Inc.
Walter W. Wilson
Mgr., Engineering Dept.,

SCINTILLA MAGNETO COMPANY, INC.

Factory and Offices at Sidney, New York



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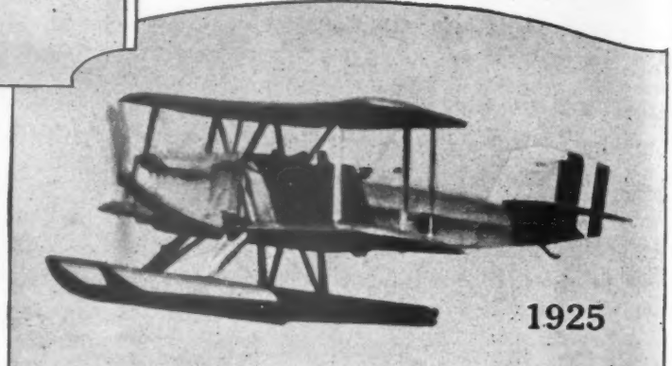
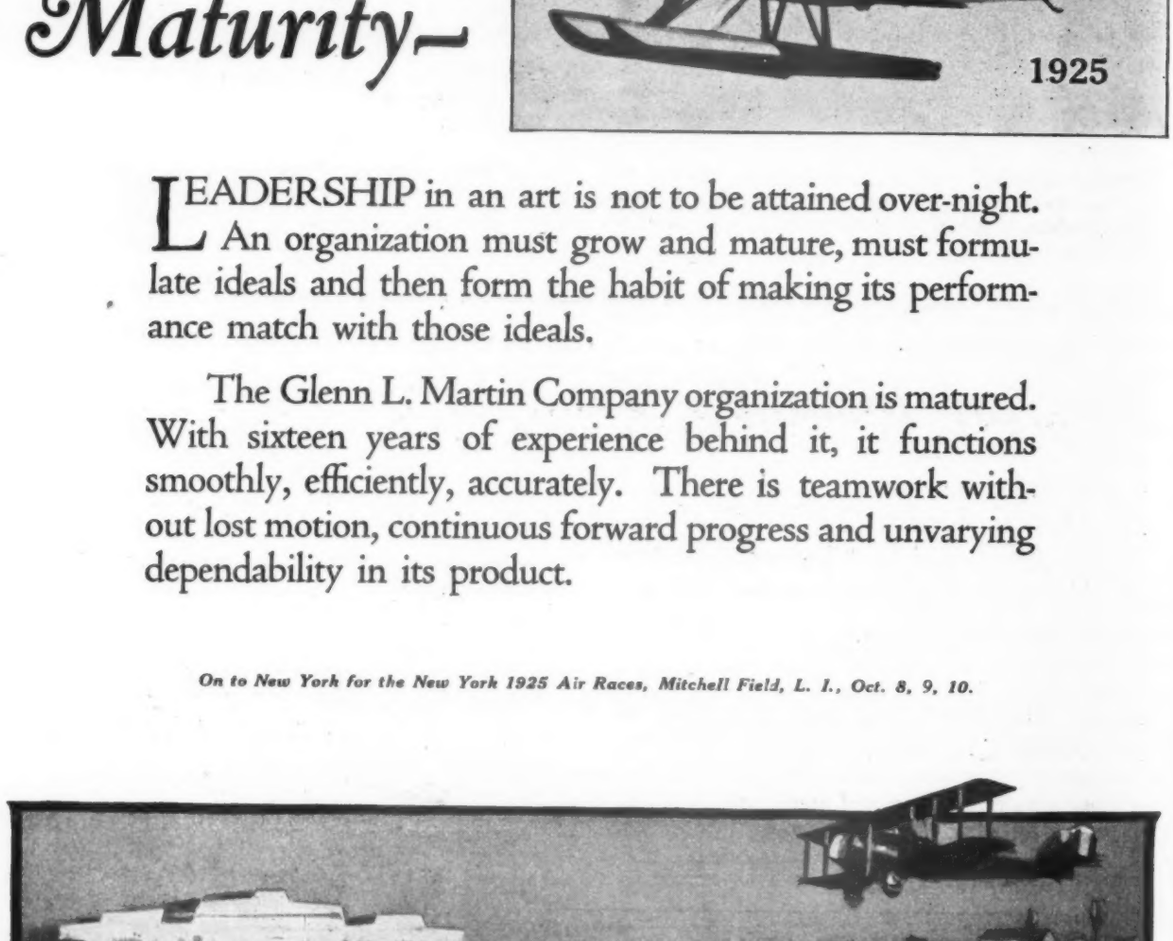


Maturity—

LEADERSHIP in an art is not to be attained over-night. An organization must grow and mature, must formulate ideals and then form the habit of making its performance match with those ideals.

The Glenn L. Martin Company organization is matured. With sixteen years of experience behind it, it functions smoothly, efficiently, accurately. There is teamwork without lost motion, continuous forward progress and unvarying dependability in its product.

On to New York for the New York 1925 Air Races, Mitchell Field, L. I., Oct. 8, 9, 10.



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VOL. XIX SEPTEMBER 28, 1925 No. 13

Bombing Accuracy—23 Per Cent Upward

THE astonishing verification of the claims for aircraft bombing of battleships contained in Major Simpson's article printed in this issue, should cause discussion all over the world. This may seem a broad statement but it is true that AVIATION is read in every important aeronautical country.

The rewards of exaggeration, or that which official circles consider to be overstatement, are very apparent. Captain Norbert Carolin, by his claim of 80 per cent bombing hits, has made it possible for the aircraft advocates to know that the impartial Ordnance Department, from its records, believes that an average bombing crew can make 23 per cent hits in the vulnerable area around a battleship. With this as the minimum of performance, which is slightly less than the actual hits, the percentages rise to 39 per cent for an excellent bombing crew and 53 per cent for a remarkable team. While the results to date, it is claimed, only approximate the average of 25 per cent, the frank admission that one out of four bombs dropped from 9000 ft. will be damaging to a battleship should precipitate a new investigation of the bombing claims.

Translated into terms of money, it means that $1,000,000 worth of bombing planes—twenty-five—each carrying only one bomb each, can place six bombs in the danger area around a battleship under favorable conditions. With improvement in the bomb sights, more training and larger bombing planes, the possibilities of bombing are more startling than even the "air enthusiasts" have hoped for.

Corps Area Airways

THERE is one way in which the Army Air Service can help commercial aviation, increase public interest in aeronautics, and at the same time furnish its personnel with valuable cross country flight training, without obtaining the sanction of Congress.

The establishment of miniature airways within each Corps Area is the plan suggested. There are, in various parts of the country, particularly on the Atlantic Coast, numerous municipal and private flying fields, established by various patriotic and progressive communities and organizations. These fields are usually opened with some sort of flying meet and local celebration, but it frequently occurs that, from the day of the opening, an entire year may elapse without these fields being used again. As a result, local interest in aviation suffers a severe and frequently permanent relapse and the reaction on the part of the community against things aeronautical is more pronounced than if the field had never been established. Very naturally the local friends of aviation feel that if, after establishing a field, there is not enough interest or enough flying being done, and the field remains unused for a long period, their efforts have been wasted, and, through this feeling, both military and civil aviation suffers.

It would be a very simple matter for the Air Officer in each Corps Area to have a list of all such fields within his district and he could very properly arrange a system of airways throughout the area to include every field of this sort suitable for use. Pilots should be sent over these airways as frequently as possible, certainly not less frequently than every two or three months with instructions to land at these fields, visit the townspeople and then proceed to the next. This would give the pilots valuable cross country training, it would establish a direct and valuable contact between the Army Air Service and the civilian population and it would make the citizens of the nation feel a personal interest in aviation and that this interest in its behalf was appreciated.

In the states in which there are Air Service units in the National Guard, this work could be well done by these units, and by so doing, would establish even more closely the intimate and personal contact between the public and the military, which is so much to be desired.

Airplane and Motor Boat Races

AIRMEN can read and study with great interest the reported details of the national Motor Boat speed contests for the much coveted Gold Cup Trophy which has just concluded at Manhasset Bay. Only three out of nine starters finished a ninety mile course or about a two hour run. The races brought out many successes and yet many failures and, we of the aviation world can, perhaps, symphasize with our speed boat contemporaries in their shortcomings more than all others. There has always been much criticism from the lay press and the public at large of the reliability of the airplane under stressed conditions and yet we should like to inquire how many compare the performances in the air with complimentary activities on the water.

Consider airplane racing on the one hand and motor boat racing on the other and the similarities between the two are immediately very apparent. In both cases the craft are the very acme of delicacy and refinement in construction. Both are tuned to a high order and each type of craft is powered with an engine, frequently identical, for most modern power boats look to the aircraft engine designers for the equipment of their vitals. And what of the results? How identical in quality at least are the performances set up.

We frequently endeavor to point out that the reliability of the airplane as a means of transportation can never be judged from a knowledge of the performances as set up in air races. And here likewise in the case of the motor boat we find the same conclusion to draw.

Not even the Speed boat Nuisance which set a new record in the recent races was able to continue to the conclusion of the contest and her 49 m.p.h. were all too sufficient to completely put her out of action after 30 mi. of racing. Yet we learn of motor boats being used by prominent New York business men in commuting from their southern homes to the city for business purposes. And this method of travel is found to be reliable. So likewise is it in the case of air travel and a more broadminded outlook in the minds of the public will surely soon bring this fact to notice.

Post Office Air Mail Bids Opened

Nineteen Bids Tendered on Eight New Air Mail Routes

First bids for air mail contracts under the law passed by Congress early this year were opened on Sept. 15 by the Post-office Department. Proposals on the operation of eight routes were asked for and seventeen bids were received.

Two bids were received for the Los Angeles-Seattle route, as follows: The Western Air Express, Inc., Los Angeles, 80 per cent of the postage derived, proposing to use Stout all-metal planes; Wyley F. Crist, San Francisco, 75 per cent of the postage derived, providing 800 lb. of mail daily each way for a period of three years, using Wright J4 planes.

For the Salt Lake-Los Angeles route two bids were submitted, as follows: The Western Air Express, 80 per cent of the postage derived; the Ontario Aircraft Corporation, Ontario, Calif., 73.1 per cent of the postage derived, using Boeing Model S planes.

For the Elko-Pasco route one bid was submitted: Walter T. Varney, San Francisco, 80 per cent of postage derived, proposing to use two planes, with two in reserve.

For the Chicago-Fort Worth-Dallas route two bids were submitted: National Air Transport, Inc., Chicago, 80 per cent of postage derived, proposing to use ten Curtiss carrier pigeon planes, four for use daily and six in reserve; the General Airways System, Inc., New York, 80 per cent of postage derived.

The Chicago-St. Paul-Minneapolis route, two bids: The National Air Transport, Inc., Chicago, 80 per cent of postage derived, proposing use of Curtiss carrier pigeon planes, two for daily use and three in reserve; General Airways System, Inc., New York, 60 per cent of postage derived.

New York-Boston route, four bids: The Colonial Air Lines, Inc., Naugatuck, Conn., 80 per cent of postage derived; The Federal Aircraft Company, Newark, N. J.; 76 per cent of postage derived, proposing use of Curtiss planes; Eastern Air Transport, Inc., of Boston, 80 per cent of postage derived, proposing use of Curtiss Lark J4 planes; General Airways System, Inc., New York, 75 per cent of postage derived.

The General Airways System, Inc., of New York submitted a combined bid for four routes at 55 per cent of the postage derived if granted contracts for all four routes. The routes were the Chicago-St. Paul-Minneapolis, Chicago-Fort Worth-Dallas, Chicago-Birmingham and Chicago-St. Louis.

Boston, Hartford and New York—Distance, 190 mi.; time, 2 hr. and 20 min.; postage, 10 cents an ounce.

Birmingham, Nashville, Louisville, Indianapolis and Chicago—Distance, 630 mi.; time, 7 hr. and 25 min.; postage, 10 cents an ounce.

Minneapolis-St. Paul, La Crosse and Chicago—Distance, 352 mi.; time, 4 hr. and 20 min.; postage, 10 cents an ounce.

Dallas-Fort Worth, Oklahoma City, Wichita, Kansas City, St. Joseph, Moline and Chicago—Distance, 1,000 mi.; time, about 12 hr.; postage, 10 cents an ounce.

St. Louis, Springfield, Ill., Peoria and Chicago—Distance, 275 mi.; time, 3 hr. and 2 min.; postage, 10 cents an ounce.

Pasco, Wash., Boise, Idaho, and Elko, Nev.—Distance, 445 mi.; time, 5 hr. and 10 min.; postage, 10 cents an ounce.

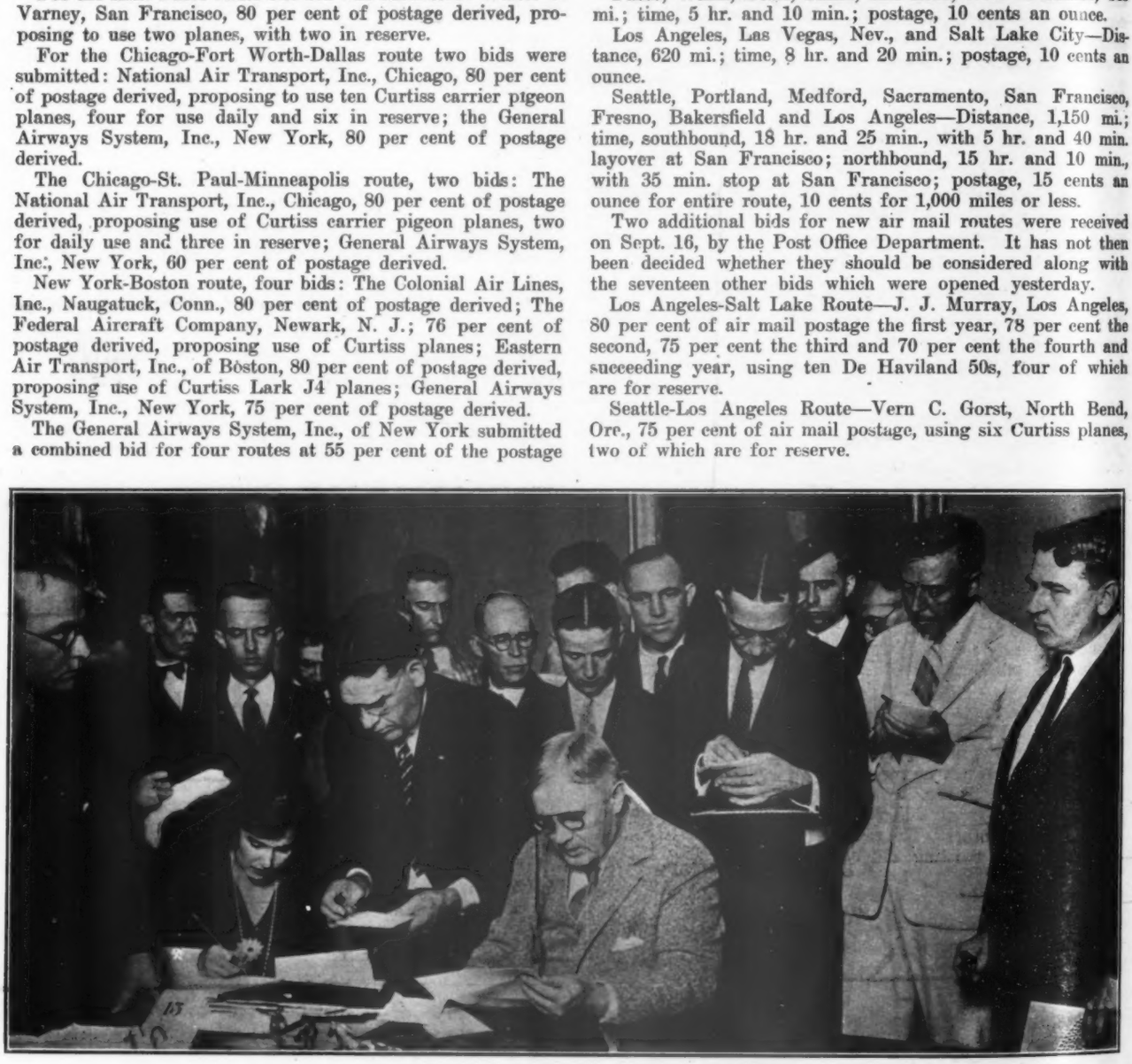
Los Angeles, Las Vegas, Nev., and Salt Lake City—Distance, 620 mi.; time, 8 hr. and 20 min.; postage, 10 cents an ounce.

Seattle, Portland, Medford, Sacramento, San Francisco, Fresno, Bakersfield and Los Angeles—Distance, 1,150 mi.; time, southbound, 18 hr. and 25 min., with 5 hr. and 40 min. layover at San Francisco; northbound, 15 hr. and 10 min., with 35 min. stop at San Francisco; postage, 15 cents an ounce for entire route, 10 cents for 1,000 miles or less.

Two additional bids for new air mail routes were received on Sept. 16, by the Post Office Department. It has not then been decided whether they should be considered along with the seventeen other bids which were opened yesterday.

Los Angeles-Salt Lake Route—J. J. Murray, Los Angeles, 80 per cent of air mail postage the first year, 78 per cent the second, 75 per cent the third and 70 per cent the fourth and succeeding year, using ten De Haviland 50s, four of which are for reserve.

Seattle-Los Angeles Route—Vern C. Gorst, North Bend, Ore., 75 per cent of air mail postage, using six Curtiss planes, two of which are for reserve.



Harris and Ewing

Postmaster General Harry S. New (seated), with newspaper men as spectators, opening the bids for contract air mail service on the new feeder routes

Flight Tests of the New Curtiss Racer

First of Three New Racing Planes Tested at Mitchel Field

THE first of the three Curtiss racers under construction at the Garden City plant of the Curtiss company, was put through its preliminary trials during the week of Sept. 19 and was considered in every way to be a great achievement in racing airplane design. Several flights in the earlier part of the week when Lieut. Alford J. Williams, U.S.M., who is to pilot the Navy entry in the Pulitzer Race, and Lieut. James H. Doolittle, A.S., flew the plane for short trials, served to indicate the thorough airworthiness of the racer. It was not until this was definitely demonstrated that attempts to determine the speed qualities was made. On Sept. 18 Lieutenant Doolittle, for the first time, opened the throttle wide and flew the actual course of the Pulitzer Race from Mitchel Field, where these tests were carried out. W. L. Gilmore, chief engineer for the Curtiss Company, timed the trials and reported an average speed of 254 m.p.h. for two circuits of the course, thus exceeding by approximately 11 m.p.h. the last Pulitzer speed figure set up when the Navy Curtiss racer won this race at St. Louis in 1923, the speed then being 243.6 m.p.h.

One Kilometer in 7.4 Seconds

On the same day Lieutenant Williams flew the new racer and made a speed course trial, flying over a distance of one kilometer. Electrical timing gave the exact passing of the wires at each end of the course. The airplane climbed to a height of two or three hundred feet and dived for the starting line, flattening out approximately 100 ft. above the ground and proceeding level over the kilometer course. There was a favorable trailing wind of about 10 m.p.h., which would increase the actual speed made by the plane. The one kilometer distance, however, was covered in an elapsed time of but 7.4 sec., which indicates a ground speed of over 300 m.p.h. This flight, although recorded by the officials of the Curtiss company, was not officially observed and cannot therefore, be recognized as a world speed record. Trials for the purpose of bringing back to America the speed record of the world will be made at a later date.

Constructional Details

The new Curtiss Racers, though differing very slightly in general design from the 1923 type, flown also in last year's Pulitzer race, possess, however, a number of detailed modifications tending toward the attainment of an even greater speed.

Its total weight, ready for the race, will be only about 2,150 lb. Built on the monocoque principle, the body or fuselage of the craft consists of four longitudinal members of wood, supported by diaphragms or bulkheads at regular intervals and covered with thin layers of wood veneer. These layers, in order to give the greatest strength possible, are cut in narrow strips, approximately two inches wide, securely glued and tacked to the longitudinal members at an angle of approximately 45 deg. to the center line of the fuselage. Succeeding layers of this veneer are placed at an angle of 90 deg. to each other. The extreme strength of such construction as regards twisting and bending is obvious. The wings and tail surfaces are built up of wood, ribs and spars also covered with thin strips of plywood. These strips are of two-ply spruce about 3/32 in. thick.

Factor of Safety Extremely High

The general appearance of the airplane is that of a very cleanly designed conventional one-strut biplane. The overall span or width of the airplane is 22 ft. The total wing area, not including that of the axle-fairing, is approximately 144 sq. ft. When the airplane is fully loaded, every square foot of the wing surface supports 14.9 lb. of load in flight.

Preliminary ground tests which have been conducted have proved the structure to be extremely strong, the successful loading in many cases having been carried well beyond the high required factor of safety.

The Power Plant

The engine is the most noteworthy feature of this new racing airplane, it being a very definite advance upon the D-12 type with which the previous racer was fitted. Though similar in size and appearance to the D-12, the new engine, designated the type V-1400, is no less than 30 lb. lighter, while developing over 100 hp. more than the earlier engine. Its rated power is stated at 619 hp. at a propeller speed of 2500 r.p.m. Thus, the new engine represents an increase in power of 20 per cent over that developed by the D-12, which gave 500 hp. Lighter weight, greater power, and consequently increaesd efficiency, therefore, mark the advanced features of the V-1400.

In the plane itself every attention has been paid to the streamlining of all parts, just as in past years, and all turnbuckles and bracing fittings are built into the fuselage or wings and it is claimed that a saving of approximately 50

Wide World Photo

At the time of the test flights. Left to right: Col. B. Fowlers, in command of Mitchell Field; Lieut. Al. Williams; Major Gen. Mason M. Patrick, Chief of the Air Service; Lieut. James H. Doolittle

per cent in head resistance of these parts is thereby obtained. Extreme care has been given to the metal fittings throughout, ample strength being assured in all cases, and bronze of a tensile strength of 105,000 lb., has been utilized, this being approximately twice that of normal bronze.

The streamlining has been carried out in a similar manner to past practice in the Curtiss racing designs, and the landing gear and wheels are almost identical with that of the last racer, there being an airfoil shaped axle between the wheels which are themselves streamlined across the hubs with aluminum discs. The wing radiators are slightly modified, mainly in the matter of size, being a little longer than in former Curtiss racers. They are constructed of brass sheeting 0.004

The Ford Reliability Tour

THE commencement of the Ford Reliability Tour is now at hand, the airplanes entered for tour of middle western cities and states being due to start on the first leg of the circuit on Sept. 28. Approximately twenty entries are listed for the event, which, it is particularly stipulated, is not in the form of a contest but a straight forward tour for commercial airplanes tending to encourage the reliable and useful operation of aircraft for commercial and general civilian purposes. The route, which connects eleven other mid-western cities in addition to the commencement and finish at Detroit, is 1900 mi. in length and is to be completed during the week ending Oct. 3.

The tour starts and ends on the Ford airport at Dearborn, which in one year has become a center of great aircraft development, both from the manufacturing and operating standpoint.

In all of the towns to be visited the airplanes will remain long enough for a thorough inspection while they are being serviced on the landing fields. The itinerary includes Fort Wayne and Chicago on Sept. 28, Moline, Ill., Des Moines, Ia., and Omaha on the 29th, St. Joseph and Kansas City on the 30th, St. Louis on Oct. 1, Columbus and Indianapolis on the 2nd, and Cleveland the 3rd, with a return to Detroit the same day, via Toledo, although no stop will be made there. These cities and the territory adjacent to them have shown the greatest interest in the rise of commercial aviation during 1925, and the field of greatest opportunity lies before these cities.

The Pathfinder Plane

An airplane has been touring the route on a mission of creating general interest and in an effort to determine the exact status of the preparations for the arrival of the planes on the tour itself. Officials of the tour who accompanied the Pathfinder plane, including W. A. Mara, general chairman of the tour Raffo Emmerson, general manager, Pilot Eddie Stinson and newspaper correspondents reported upon their return to Detroit that in every one of the eleven cities along the route, interest is at a high pitch. Preparation of landing fields and development of facilities to care for the planes has already started in the cities where the planes will land, under the direction of local committees.

The cities visited by this forerunning plane included Fort Wayne, Ind., Chicago, Ill., Moline, Ill., Des Moines, Ia., Omaha, Nebr., St. Joseph, and Kansas City, following on to St. Louis, Indianapolis, and Columbus and Cleveland and thence back to Detroit.

The Trophy offered by Edsel Ford will be inscribed with the name of the manufacturer and pilot of each plane finishing within the requirements. Five such victories will entitle any manufacturer to permanent possession of the trophy. What the airplane can do in commercial enterprises is the knowledge sought by the promoters of the Tour, headed by William B. Mayo, chief engineer of the Ford Motor Co., and president of the Detroit Aviation Society, which is sponsoring the Tour. The Military will take a part in entertaining and enlightening the spectators during the progress of the Tour, but it will in no sense dominate the show.

Thus far the following companies have signified their intention of entering planes in the tour.

Stout Metal—Division of Ford Motor Co. (1 plane); Travel Air, Inc., Wichita, Kans. (3 planes); "Waco"—Advance Aircraft Co., Troy, Ohio. (2 planes); "Lark"—Curtiss Aeroplane & Motor Co., N. Y. (2 planes); Fokker Airplane Co.—Holland. (2 planes); Special Monoplane—Wright Airplane Co., Dayton, Ohio (1 plane); Commercial—Martin Co., Cleveland, Ohio, (2 planes); "Canary"—Johnson Airplane & Supply Co., Dayton, Ohio (1 plane); Pass. Monoplane—Junkers Co., Dessau, Germany (1 plane); New Swallow—Swallow Airplane Mfg. Co., Wichita, Kans. (3 planes).

The entire period of the six-day Aero exposition will be interesting, and a very large number of interested spectators is expected. No charge will be made for admittance at any time during the Tour.

The Ford Motor Company is taking a leading part in the tour. Besides providing the trophy and cash prizes for pilots, it is arranging for a really comprehensive aircraft exposition. One section of this will be for manufacturers of airplane accessories. Another section will hold material and craft that have played their part in America's aerial history, such as the Round the World planes.

This exposition will be without an admission charge, and neither will there be any charge for admission to the airport at the start and end of the tour, or for any event on the lengthy program of aerial events that will be conducted all during the week of the tour.

Plans for this program are not entirely perfected but a balloon race for a $2,500 trophy offered by the *Detroit News* is one of the events. This will be open to Army, Navy and civilian pilots. Edward Stinson, one of the country's pioneer commercial pilots, is endeavoring to bring off his endurance test in an effort to better the recently created French record of 45 continuous hours in the air. He will try a scheme of re-fueling in the air, as yet in the experimental stage, as a means of bettering this mark.

Following is the schedule for the tour:—

Leg 1. Sept. 28—Leave Detroit 10 a. m. (E.S.T.); arrive Ft. Wayne 10:42 a. m. (C.S.T.); Leave Ft. Wayne 2 p. m. (C.S.T.); arrive Chicago 3:50 p. m. (C.S.T.)

Leg 2. Sept. 29—Leave Chicago 8 a. m. (C.S.T.); arrive Moline 9:53 a. m. (C.S.T.); Leave Moline 11 a. m. (C.S.T.); arrive Des Moines 12:24 p. m. (C.S.T.); Leave Des Moines 2 p. m. (C.S.T.); arrive Omaha 3:35 p. m. (C.S.T.).

Leg 3. Sept. 30—Leave Omaha 8 a. m. (C.S.T.); arrive St. Joseph 9:30 a. m. (C.S.T.); Leave St. Joseph 11 a. m. (C.S.T.); arrive Kansas City 11:38 a. m. (C.S.T.); Leave Kansas City 1 p. m. (C.S.T.); arrive St. Louis 3:56 p. m. (C.S.T.).

Leg 4. Oct. 1—Leave St. Louis 1 p. m. (C.S.T.); arrive Indianapolis 3:52 p. m. (C.S.T.).

Leg. 5. Oct. 2—Leave Indianapolis 9 a. m. (C.S.T.); arrive Columbus 12:12 a. m. (E.S.T.); Leave Columbus 3 p. m. (E.S.T.); arrive Cleveland 4:38 p. m. (E.S.T.).

Leg 6. Oct. 3—Leave Cleveland 1 p. m. (E.S.T.); arrive at Detroit 2:34 p. m. (E.S.T.).

Continued from page 383

and 0.005 in. thick, and this, it will be noted, is thinner than the average sheet of paper. The wing radiators contain twelve gallons of water which circulates at the rate of seventy-five gallons per minute.

Finally, as usual in recent Curtiss airplanes, all three planes will be equipped with the Curtiss Reed duralumin propeller.

The main dimensions of the 1925 racers are:—

Span	21 ft. 9 in.
Chord, upper wing	4 ft. 8¼ in.
Chord, lower wing	3 ft. 3¾ in.
Overall length	19 ft. 9¾ in.
Weight fully equipped	2200 lb.

It is a very interesting feature that in this airplane, with its engine developing no less than 619 hp., the total power loading is but 3.75 lb. per hp., and this figure compares very favorably with the loads per horsepower of earlier types of engines alone. Thus, it will be recalled that the original Curtiss OX engine, which weighed 400 lb. and developed 90 hp. and was considered a very fine engine, was loaded to the extent of 4.5 lb. per hp. in itself, and the great improvements which have been made can be visualized by a comparison of this figure with the loading of the complete Curtiss racer of but 3.75 lb. per hp. including pilot and sufficient fuel for a two hour flight.

President's Air Board Commences Sessions

Hopes to Make Recommendations Before Congress Meets in December

THE special Air Board appointed by the President to make a far-reaching inquiry into the aviation services of the Government, with relation to national defense, met with Mr. Coolidge at the White House on Sept. 17, later at a meeting of its own choosing Dwight W. Morrow as its chairman and deciding to begin hearings, open to the public, on Monday, Sept. 21.

It was said by the board that all the sessions of the investigation will be open. The hearings will be held in the room of the House Interstate and Foreign Commerce Committee and the first witnesses called will be officials of the Army, Navy and Postal Air Services.

The board members were the guests of the President at luncheon at the White House and immediately afterward went into preliminary session in the Cabinet room and selected Mr. Morrow, the New York financier, as its chairman. It also named Judge Arthur C. Denison as vice chairman and William F. Durand, secretary.

In a statement of its policy the board announced that the first witnesses to be heard will be interrogated as to the present conditions, organization, equipment, mission, and the relation of the Army, Navy and Postal Air Services to one another. After those who are now responsible for Federal air policy have been examined, the other witnesses will be invited to testify, and it is then that Colonel Mitchell will be asked to present "criticisms" and "constructive suggestions." The board's statement follows:

In his address to the Air Board, President Coolidge gave its members no definite instructions as to procedure. He left the board free to map out its own plan of action, merely suggesting that the board be ready to make a report in time for consideration by Congress at this winters' session. The President is said to have expressed the hope that the inquiry would be thorough, impartial and exhaustive, dealing with commercial aviation in all its aspects as well as with aviation in its relationship to the national defense.

Dwight W. Morrow

There was a full attendance of the board at the first session. Those who are associated with Chairman Morrow, Vice Chairman Denison and Secretary Durand in this investigation which is expected to attract widespread attention, are Major Gen. James G. Harbord, former Chief of Staff of the Army; Rear Admiral Frank F. Fletcher, U.S.N., retired; Howard E. Coffin, aeronautical engineer; Senator Hiram Bingham of Connecticut, and Representative Carl M. Vinson of Georgia, Democrat, and Representative James S. Parker of New York, Republican.

Present indications are that the Air Board will meet daily throughout September, October and a part of November, and that its report will be ready for President Coolidge early in December. It is the hope of Administration leaders that the report will be used by Congress as a basis for legislation outlining a definite policy to guide the Government in the field of aviation.

The unified service advocated by Colonel Mitchell will be given careful study, Colonel Mitchell will be allowed to present his arguments in this regard at length. Opponents of the plan will be heard. Administration officials, while not prejudging the case, regard the proposal of a unified air service as a mere detail as compared with the larger problem of commercial aviation and its direct relationship to national defense.

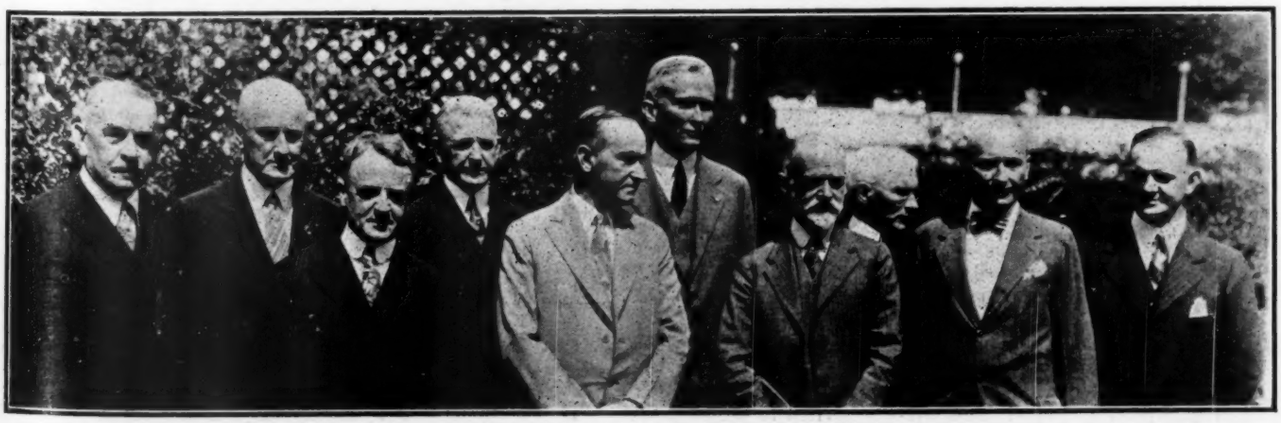
The investigation will be divided into four parts:

First—Presentation of Army views on air policy, together with the condition of the Army service, and its possibilities in the matter of national defense, by officers of the War Department.

Second—A like presentation in behalf of the Navy by Secretary Wilbur and other officers of the Navy Department.

Third—Present condition, organization, equipment and mission of the Postal Air Service, to be presented by Postmaster General New and air officials of the Postoffice Department.

Fourth—Present state of aviation industry in the United States, plans for its advancement and its future possibilities.



President Coolidge with members of the Air Board.

Left to right: Rear Admiral Frank L. Fletcher, Major General James G. Harbord, Dwight W. Morrow, Chairman of the Board, Hon. James F. Parker, President Coolidge, Senator Hiram Bingham, W. F. Durand, Hon. Arthur D. Denison, Howard Coffin, Hon. Carl Vinson

Shock Absorbers for Flying Boats

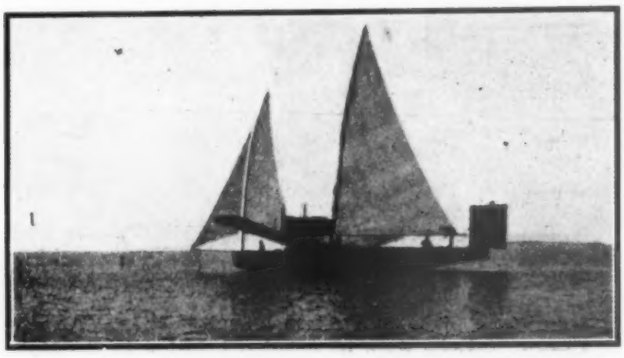
The Development of Large Seaplanes Opens Up Fresh Problems

NOTWITHSTANDING the satisfactory termination of the West Coast-Hawaiian Islands flight of the PN9 No. 1, and the undoubtedly very remarkable achievement, not only of Commander Rodgers and his crew, but likewise of the flying boat itself, in successfully landing upon and navigating the high seas of the Pacific Ocean, there are many lessons to be learned from the various aspects of the whole event.

It is a very noteworthy fact that, as a result of the exceptional skill of both Commander Rodgers and Lieutenant Connell, who are experienced navigators, it was possible, with the aid of an extemporized rig of fabric torn from the wings of the seaplane and erected in the form of a fore sail, to sail the PN9 as a normal sailing ship and in this way, in spite of the extreme limitations due to the inadequacy of sailing rig, to actually navigate in the direction of what was to these men deliverance. This performance has served to prove conclusively, not only the seaworthiness of the PN9 design in particular, and this type of large seaplane in general, but, also the ability to actually navigate, under sail, flying boats of this class.

A Sailing Seaplane

It will be recalled that last year the German aircraft designer Rohrbach, in producing a very large type of twin-engined monoplane flying boat, demonstrated its peculiar seaworthiness by fitting a normal type Marconi yacht rig and sailing the flying boat on the surface under normal sail power. It is not known to what extent these tests have been carried, but it is believed that it was only under the most favorable conditions that these tests were carried out.



The Rohrbach Flying Boat under sail

The recent experiences of the Naval fliers in the PN9 serve to completely answer this question as to the adaptabilities of the yacht sail principle to the large sea going flying boat. It was proved conclusively that with adequate sailing rig, the crew could have sailed their boat to the Island of Oahu, three or four days after their enforced alighting, instead of, as was the actual case, some nine or ten days.

Severe Landing Shocks

This question of equipment of large ocean going flying boats is, however, secondary to more important features of design which are immediately suggested by the experiences of the Hawaiian Flight. It will be remembered that one of the first radio messages picked up by the Aroostook from Commander Rodgers immediately before the long and anxious period of waiting during which time the fliers were all but given up for lost, reiterated and emphasized the fears in the minds of the crew that if they were compelled to alight without engine power, they would surely crack up as a result of the great strains and shocks upon the flying boat's hull, due to the heavy seas.

In spite of the fact that this, fortunately, was not what actually happened, it has nevertheless forced attention toward this liability of the seaplane type to failure as a result of the extreme shocks of alighting under difficult sea conditions.

Hull Flexibility

The question of shock absorption, although the subject of extensive research and general attention in the case of the airplane, has been almost entirely neglected in its application to the flying boat. It is believed that a few individual experiments have actually been carried out in the past but these have not been very extensive so far as available information is known.

The problem of shock absorption in flying boat hulls is, in some respects, very closely akin to that in respect of the normal type of airplane wheel undercarriage, while at the same time, the allied problems are very much involved. Major Linton Hope, an English designer, constructed all his later hulls with the definite aim of making these flexible to a considerable extent in an effort to overcome the problem of shock absorption on alighting. Though it is true that, to a certain extent, the Linton Hope type of hull does actually possess considerable shock absorbing characteristics, it cannot be regarded as anywhere near perfection in this respect, in fact, its entire flexibility is, to a certain extent, disadvantageous.

Shocks are Localized

From a study of the vibrations in the hull bottom while taxiing at high speed, it has seemed very evident that the pressures exerted on the hull bottom and the chine are quite local, and are, therefore, capable of being met by localized shock absorption devices. This, therefore, would definitely place at a disadvantage any designs which incorporated a completely flexible hull structure, for it is necessary and desirable to absorb shocks only at these specific points.

There have been numerous cases of flying boat accidents caused during landing on a choppy water surface, and in the majority of such cases, if the accident has been definitely attributable to the condition of the water, the damage done has taken the form of a crashed hull bottom at a position just in front of the step.

A Sprung Planning Bottom

During the war, the British undertook a series of experiments relating to the prevention of this class of accident. In these tests, the original rigid forward position of the hull bottom was replaced by a flexible portion extending as far back as the step. This flexible part was hinged at a point previously determined by the position of minimum vibration during taxiing, and the shock absorbing qualities of this portion were provided by the insertion of suitably stiff coil string between it and the main hull bottom. The method will be made clear by reference to the accompanying drawings in Fig. 1.

When tested out, this device indicated that although not entirely satisfactory, much of the object had been achieved. Thus, in fast taxiing on a surface broken by short waves 6 or 9 in. high, all shocks were completely absorbed, but where the wave height increased to 18 or 20 in. this was not the case. Furthermore, planing at high speed on the step, the angle and position of which had been maintained constant, was by no means pleasant, and a pronounced pitching motion was set up.

It was thought that this might be due to an excessive amount of rebounding in the absorption device, and its comparatively large inertia. To overcome these faults, the coil springs were replaced with rubber shock absorber padding,

with a view to this serving the same absorption purpose but having less inertia and less rebound.

The results, however, were not satisfactory in spite of every endeavor being made to maintain the step characteristics as in the original hull design. The increased rigidity permitted all shocks to be transmitted to the hull and the results were little better than those to be expected from a normal

Fig. 1

type of hull. The longitudinal pitching was, however, reduced though not eliminated. Furthermore, the continued presence of this pitching feature appeared to indicate that too much attention had been given to the absorption of shocks all along the hull, whereas in reaity it was only necessary to provide absorption devices at those parts where the shocks were greatest, bearing in mind that such shocks had been found to be very localized.

Shocks Absorbed Locally

Accordingly, an entirely new method of attacking the problem was attempted, in which individual absorbers were fitted to the normal hull bottom in the form of laterally fitted slats extending downward and backward from the hull bottom and rigidly attached to this only at the stub-ends. These slats, formed of wood and tapered carefully, possessed considerable resilient properties, and served to absorb the localized shocks put upon them individually. The plan will be made clear by reference to the diagram (Fig. 2).

Fig. 2

If memory serves correctly, these experiments were never completed, but were satisfactory to the extent to which they were pursued. All sharp shocks of both small and large waves were absorbed completely during high speed taxiing on the step. The longitudinal pitching present formerly, was entirely eliminated and there seemed no marked difference between the taking off and landing qualities of the flying boat so fitted and the normal type, except that the modified example was more comfortable in taxiing, and less violently effected by landing shocks.

The Metal Hull Problem

It would seem that these experiments are worthy of continuation, since, with the advent of large sea going flying boats and their operation not only in the air, but also on the surface of the high seas, the question of landing shocks is becoming of primary importance, as was characterized in the final message received from the PN9 before she dropped from the sky with dead engines, in mid-Pacific and absented herself for a period of nine days.

So far as is known, no attempts have been made to provide shock absorption for these large flying boats and the design of an all metal hull possessing flexible qualities in itself would seem an impossibility. These notes, therefore, may serve to open up active discussion of this point.

The Next War—Air..... ?

Editor, AVIATION:

I have just read your interesting letter in the Sept. 7 number of AVIATION. The problems you mention are very serious and have been given a great deal of thoughtful consideration by a number of Air Service officers. I would like to point out a few facts that may be of interest to you along these lines. At the recent conference on the Limitation of Armament, this question was discussed in detail and it became apparent that a nation which had a strong and flourishing industry devoted to the manufacture of aircraft for commercial and civil use might secretly and efficiently prepare for war for months ahead of the time of formal declaration or unexpected attack.

While it, admittedly, takes a long time for an industry to get into full swing on a war program, I would like to point out to you that the late Mr. Bryan's hope of a million men rushing to arms over night was also not without fallacy. It takes an appreciable time to mobilize, train and equip a modern army. The preparation for aerial warfare may be conducted with far greater secrecy than would be the case of either the Navy or the Army.

The United States, due to its quantity production methods as against the partial manufacture by hand employed by other nations, is at a disadvantage in the early stages of war. Quantity production by hand can be built up quicker than quantity production by machine. The eventual production by our methods, however, is very much greater than that of other nations. The existence of a flourishing aeronautical industry devoted to the manufacture of equipment for other than peace time use by the military forces is, therefore, of greater importance to the United States than any other nation. The United States will require also a comparatively larger war reserve than other nations since it will take us longer to get into production. If we could weather the first few months of the war, however, no nation, or any group of nations, should be able to equal our production. This was demonstrated conclusively during the World War, particularly with respect to the manufacture of aeronautical engines.

An examination into all the elements that go to make up Air Power discloses the fact that under present conditions the United States has potentialities greater than that of any other nation. The psychology of the Air Force is preeminently that of the American people. We have all the other resources needed for building up an air force. This nation owes its power and prosperity largely to the development of its transportation and communication facilities. The building up of the commercial and civil use of aircraft in the United States is, I believe, of tremendous importance from the standpoint of National Defense. The history of transportation and communication discloses the fact that each new means creates new trades, industries, professions, new business, and has a profound influence on every human institution. The use of aircraft and wireless should create new wealth and new opportunity just as has the automobile and the telephone, the railroad and the telegraph. It would appear, therefore, that our national apathy in developing aeronautics results not only in our failing to build up a powerful National Defense, but is actually denying to the nation a tremendous increase in wealth and opportunity.

I hope that the questions that you have raised in your letter will be fully discussed, particularly at this time, and that the people of the United States as a whole will educate themselves in the vital questions having to do with aeronautics.

H. M. HICKAM,
Major, Air Service

150 Mile Searchlight for Hartford

A large revolving searchlight, casting a beam of 450,000,000 candlepower 150 mi. into the darkness, is to be erected at the Hartford Aviation Field as a guide to air mail pilots on the new Boston-New York route by way of this city. The light will be one of three to be provided on the route. One other will be at Boston and the third at New Brunswick, N. J.

The Tulsa Air Meet

Commercial and Military Planes Figure in Oklahoma Flying Meeting

More than seventy-five miiltary and commercial airplanes took part in the Tulsa Air Meet, Aug. 30 to Sept. 4, during the national encampment of the Veterans of Foreign Wars. The meet was a success from every standpoint, except that of attendance, the convention proving a counter attraction in the city instead of adding to the crowds.

A speed race in which Army pursuit planes took part, piloted by Lieutenants Maughan, George and Craigie of Kelly Field, was the outstanding feature of the meet, the race being of unusual interest to the crowd because run over a two mile course. It resulted in a tie for Maughan and George.

The Army attack plane races and the bombing plane race were run over a five mile course, as were most of the civilian events. Captain Eglin of Kelly Field was the winning pilot in the bombing race, and pilots from Brooks Field, Kelly and Post Field are still trying to decide who won the various DH4 races.

OX's in Evidence

Lieut. Howard Fay and Dudley Watkins won the military combat and military acrobatic championship trophies, with excellent work in their maneuverbale Vought pursuit training ships.

Walter Beech, in a special built Travel Air plane which he intends to race at Mitchel Field in October, won the Free-For-All speed race for civilians. In an OX5 motored Travel Air he won the OX5 race, and another Travel Air built for load carrying, piloted by Lloyd Stearman, won the largest load trophy in the On-To-Tulsa race. Stearman carried 600 lb. A Travel Air with an Aeromarine engine of 150 hp. owned and flown by Vern Brown, oil operator of Perry, Okla., won the speed trophy in the On-To-Tulsa race. Merril Brock, of Dallas, piloting a clipped wing Canuck, won the civilian distance trophy and the efficiency prize in the same race.

Commercial Efficiency

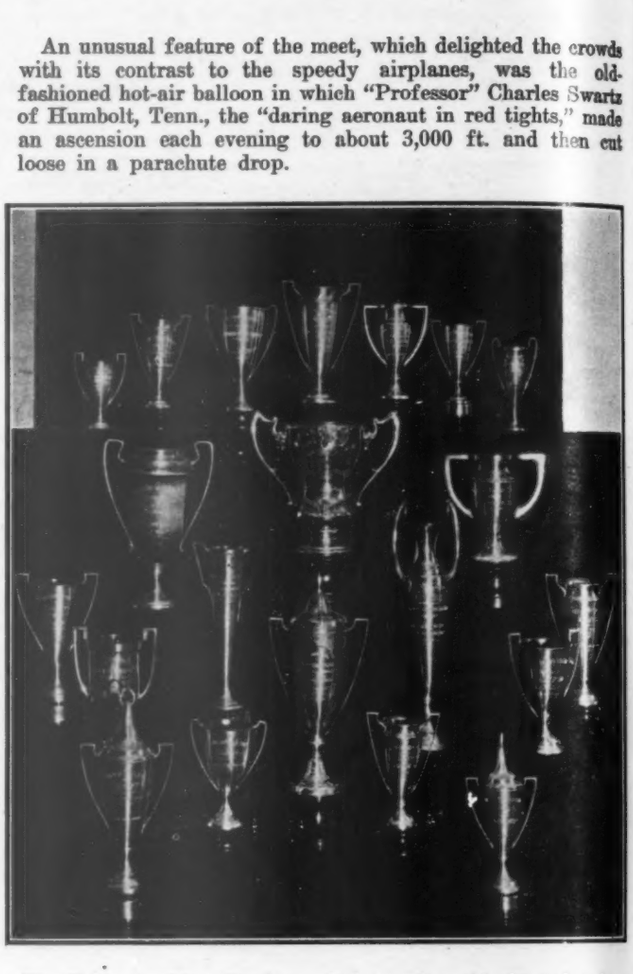
The civilian meet developed into an interesting contest between the Travel Air camp and the Waco camp, in contests of skill, maneuverability and performance, climaxed by the Commercial Efficiency race, won by the Waco piloted by I. A. Woodring, if the horsepower rating used by the judges in figuring the final score is approved by the N.A.A. contest committee. Woodring's Waco carried approximately 100 lb. more weight with an OX5 engine than did the Travel Air with a K6 engine, but was not as fast. Thus the Travel Air won the speed points and the Waco the load carrying points, giving the Waco by far the highest score on the factory horsepower rating. Beech piloted the Travel Air.

Woodring won the civilian acrobatic trophy, and the slow speed trophy, but Beech won the gliding trophy by a few seconds, holding his plane off the ground until Woodring had landed. Tex Lagrone, in another Waco, won the climbing contest.

A Revival of Montgolfier

"Trick" Entriken, flying a "Jenny," won the dead stick landing trophy by setting his ship squarely inside the marking circle, and despite his slower ship, defeated Woodring on one day in the acrobatic contest. Entriken also won the National Guard and Reserve pilots' trophy. The parachute jumping trophy was won by Norman McLeod. The Flivver-plane race was not flown as only three ships were entered and one was not ready to start. It will be held later.

An unusual feature of the meet, which delighted the crowds with its contrast to the speedy airplanes, was the old-fashioned hot-air balloon in which "Professor" Charles Swartz of Humbolt, Tenn., the "daring aeronaut in red tights," made an ascension each evening to about 3,000 ft. and then cut loose in a parachute drop.



The Tulsa Air Meet Trophies, which, together with the cash prizes, totaled $5000 in value. One Cup, bearing a special winged design, and offered by Walker S. Estes, N.A.A. governor of Oklahoma, is not included in the picture. The donors included the Tulsa Chamber of Commerce, Tulsa Tribune, Tulsa World, American Legion, J. T. Foster, Jack Gelfand, D. A. McIntyre, H. R. Tucker and Tulsa Flying Club

Captain Reynolds and Lieutenant McReynolds from Bolling Field came the longest distance to the meet, and won the Army On-to-Tulsa race, although Lieutenant McMullen from San Antonio in a CO5 made the best time in this event.

Capt. R. H. Ballard, commanding officer of Post Field, Capt. Chas. B. Oldfield, executive officer of Brooks Field, as well as Captain Eglin of Kelly Field, aided greatly in making the Army part of the meet a success. The flying operations of the Army were under the direction of Lieut. Auby C. Strickland, Air Service executive officer for Oklahoma. Among the distinguished visitors at the meet who took their first airplane rides was Sergt. Samuel Woodfill, whom General Pershing named as the outstanding hero of the World War.

The committee in charge of the meet, which was held as the principal entertainment feature of the V.F.W. convention were D. A. McIntyre and H. R. Tucker. Although a total of more than 10,000 mi. was flown during the meet, not a single forced landing occurred and no one was injured except Edward League, service manager of the meet, whose arm was broken when a motor kicked back and the propeller struck him.

The Munich Aero Show

Twenty-nine Exhibitors Make up a Very Interesting Collection of Modern Aircraft, Engines and Accessories

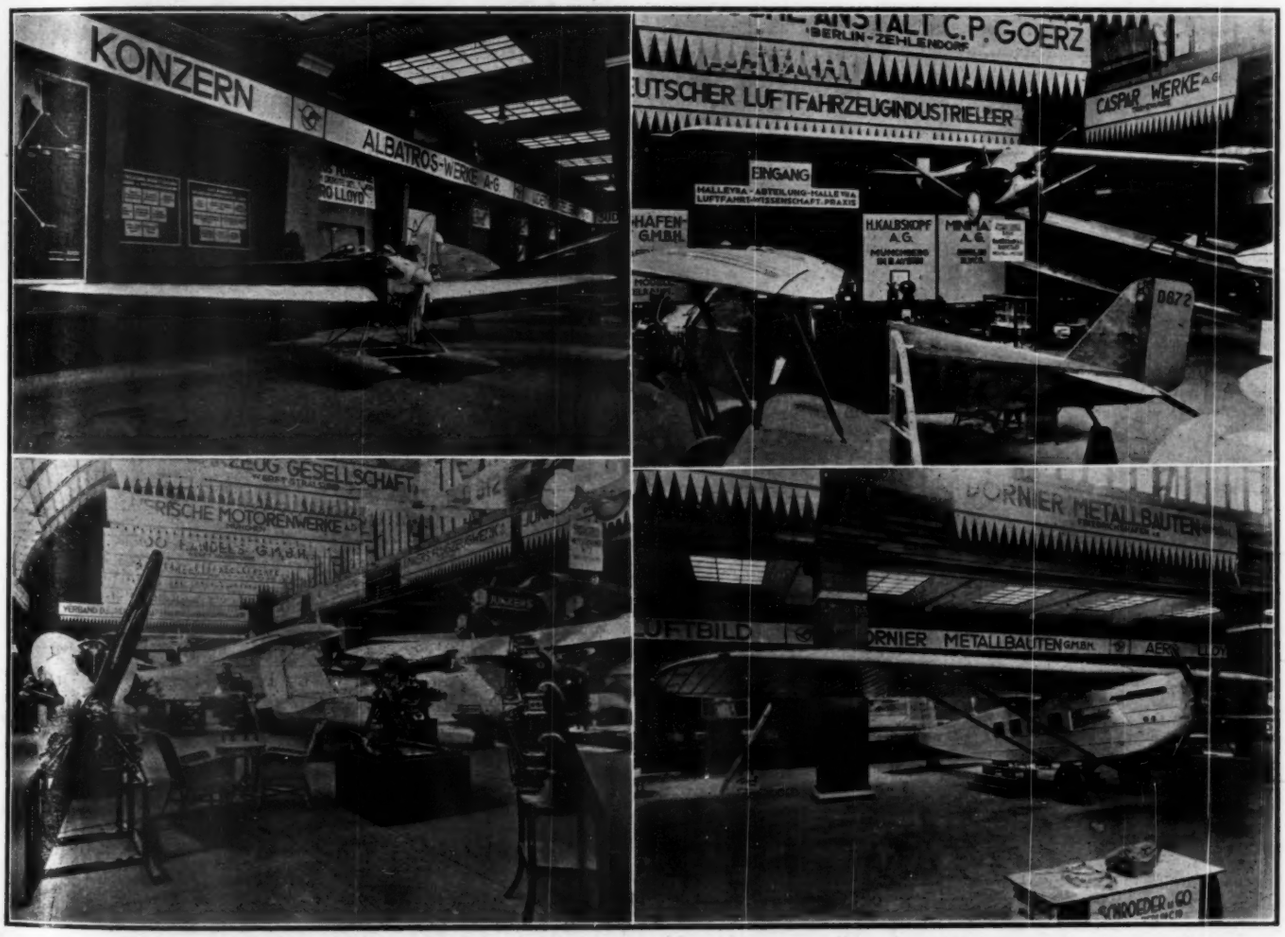
An aero show was held in Munich beginning July 15 in connection with the German Transport Exposition. In this exhibit were represented practically all of the present day airplane manufacturers. A large hall was devoted to aircraft, and, as can be seen in the views reproduced herewith, was very strikingly decorated. The airplanes exhibited furnished another demonstration that the German aircraft industry is making excellent progress despite the famous "Nine Rules."

Junkers in Evidence

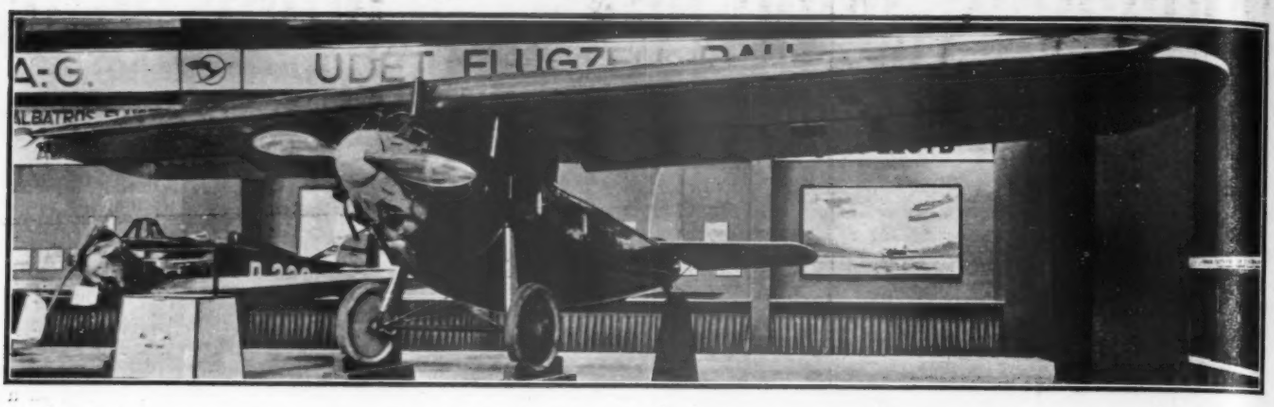
The first exhibit after entering the hall was the stand of the Rohrbach Metallflugzeubau, who also represented the Rohrbach Metal Aeroplane Co. of Copenhagen. Of course, it would have been difficult for this concern to exhibit one of their large flying boats, so they simply exhibited one wing panel which was arranged to show the method of construction, namely separate entering and trailing edge structures. The remainder of their exhibit consisted of a couple of metal floats and the tail unit of RoIII flying boat. Pictures and a small model reminded visitors of the four engined giant monoplane design of Dr. Rohrbach for the Zeppelin Company. Next to the Rohrbach stand was the stand of the Stahlwerk Mark who exhibited a high wing monoplane with one of their own engines. This machine was designed for sport use of all types. The next stand was the exhibit of the various Junkers companies and occupied nearly all of one side of the hall. On a raised dais was one of the G23 three engined passenger monoplanes which dominated the whole exhibit. The example shown in Munich had two 100 hp. Mercedes engines with a 185 B.M.W. in the nose. In addition to the large machine they showed an F13 (known in this country as the JL6) a T29 with the slotted wing, an A20 Mail Machine. The A20 is fitted with a 160 hp. Mercedes engine and is the machine which is being used on the night air mail service from Berlin to Stockholm by way of Warnemunde. This same machine is also fitted with a 77 hp. Siemens engine and is used as a taxi plane for two passengers with this power. As has been the custom of the Junkers Company all of these machines are made entirely of metal. The other Junkers companies exhibiting were the Junkers Luftverker A. G. who showed maps, photographs and statistics illustrating their air transport work and the Junkers Motorenbau, the engine manufacturing section of the Junkers interests.

The Smallest Exhibit

Near the stand of the Junkers companies was that of the Dietrich Flugzeugwerke who exhibited the DP7 Sport and Training Monoplane equipped with the 55 hp. Siemens engine. The wings of this machine can be folded back. The Caspar-Werke exhibited the C26 Biplane on the next stand. This machine has a steel tubing fuselage and wooden wing construction and is intended for school and sport flying. Nearby was



Four general views from the Munich Aero Show. Top left: The Udet U10, a two passenger sport seaplane of very clean design. Top right: The Heinkel two passenger sport plane, with the B.A.C. lightplane with Blackburn "Tomtit" engine suspended in the background. Bottom left: A corner of the engine section of the show. Bottom right: The Dornier "Komet" 3, airliner.



The Udet U8A passenger limousine on exhibition at the Munich Aero Show. The clean cantilever wing design and the careful streamlining of the radial aircooled engine are noticeable features. A careful examination of the photograph will reveal the slotted wing and aileron arrangements after the manner suggested simultaneously by Dr. Lachmann and Handley Page

the smallest exhibit in the hall, that of Kalbskopf Company who showed shock absorber cord. One of the most interesting machines of the whole exhibition was the Udet U8A. This machine is the same as the U8 limousine which they have been constructing for some time, with the exception of the cellule. The cellule consists of a monoplane wing supported above the fuselage on two very deep struts. The wing is fitted with a Handley Page slot and flaps at the trailing edge. Dr. Lachmann did considerable work on this type of wing during the war, and by an arrangement with the Handley Page company controls the patents on this construction in Germany. This machine is being used for experimental purposes and due to the design, is very adaptable to experimentation with the wing. In addition to the U8A there was a U10A seaplane, U6 monoplane and the well-known Colibri light plane. All of these machines have monocoque fuselages and cloth covered cantilever wings.

Air Transports

The Albatroswerke occupied a neighboring stand and exhibited one of their L58 passenger transport machines. This type carries seven passengers and is powered with a 240 hp. Maybach engine. This machine is being used at the present time by the German Aero Lloyd. The Albatros company also exhibited a recent sport and school machine known as the L68. Next to the stand of the Albatross Co. was a gigantic wall map showing the routes flown over by the Aero Lloyd. Near this map was the exhibit of the Dornier Metallbauten of Friedrichshafen who exhibited one of the well-known Komet III Transport machines which has been used extensively in Europe and a 70 hp. sport flying boat, the Libelle. Both of these machines have already been described in AVIATION. The Komet exhibition was fitted with a 360 hp. Rolls-Royce Eagle engine. The Dornier Wal twin engine flying boat was shown by a model, due to lack of space. In the middle of the hall was the exhibit of the Heinkel Flugzeugwerke, exhibiting one of their HD32 training biplanes. Nearby was the stand of the Arado Hendelsgesellschaft, who exhibited samples of Heinkel machines made under license. The Focke-Wulf concern exhibited only a model of their transport cabin machine, the A16.

List of Exhibitors

At each end of the hall there was a light plane suspended from the roof. At one end there was the Bahnbedarf machine which won the Zeugspitz Flight and at the other end was the Daimler light plane. There was a third light plane in the exposition. This was the Messerschmitt Glider with a "help engine." Engines were exhibited by the Junkers Motorenbau, Siemens & Halske, and the Bayerische Motoren Werke. Also hanging from the roof was one of the Heincke parachutes.

The following is a complete list of exhibitors:

1. Albatroswerke A.-G.—training plane L68, Transport L58.
2. Arado Handelsges.—Arado HD21 (type Heinkel.)
3. Bahnbedarf A.-G., light plane .
4. Bayer. Motorenwerke A.-G., engines.
5. Caspar-Wereke—Caspar C26 with 100 hp. Bristol-Lucifer engine.
6. Daimler Mot.-Ges.—Daimler light plane L20, Daimler 2 cylinder engine.
7. Aero-Lloyd A-G,—maps, pictures and statistics.
8. Suddt. Aero Lloyd A.-G., air transport data.
9. Aero Lloyd Luftbild,—trade data.
10. Dietrich Flugzeugwerke A-G,—2 seater biplane, 75 hp.
11. Dornier Metallbauten G., Dornier Komet and Dornier Libelle.
12. Focke-Wulf Flugzeugbau A.-G, Focke-Wulf Limousine A16.
13. Ernst Heinkel Flugzeugwerke, HD29 School and Sport machine, HD32 School, Sport and Touring machine.
14. Junkers Flugzeuwerke A-G, 3 engine airplane, G23; transport machine F13; sport and school machine, and a seaplane.
15. Junkers Luftverkehr A-G, rout edata.
16. Junkers Motorenwerke G., air cooled Junkers engine Lla, 17 hp. Junkers L2, 195 hp.
17. Luft-Fahrzeug-Gesellschaft, all-metal airplanes, LFG V40, 75 hp. and LFG V42, 100 hp. sport plane, LFG V52.
18. Rohrbach Metallflugzeugbau G.-Model and part of the flying boat Ro3.
19. Siemens & Halske A-G., various engines and engine mounting for light plane.
20. Schroder & Co. G., Heinecke-Parachute.
21. Stahlwek Mark A-G, sport and school machines Mel, Ms 2b, and the Mark 5 cylinder engine.
22. Steffen & Heymann, aerial cameras, instruments, etc.
23. Udet Flugzeugbau G., U10, Kolibri, U7, Flamingo U12, Limousine U8A, seaplane and model of the projected four engined Kondor.
24. C. P. Goerz, optical instruments for air travel.
25. J. Haw Propellerbau, metal propeller.
26 Hch. Kalskopf, A-G, shock absorber cord.
27. Dipl.-Ing. Messerschmitt, glider with "help engine."
28. Minimax A-G, fire extinguisher.
29. Gebr. Rank, airport arrangement model.

F.A.I. Conference

The National Aeronautic Association and a number of private aeronautical interests are planning to send delegates to the International Air Convention at Prague, which opens its sessions on Sept. 19. No official delegate of the Government will be named since the United States is not a party to the international air convention.

The Natl. Aero Assn. sent four delegates headed by its President, Godfrey L. Cabot, to the Conference of the Federation Aeronautique International, it is reported. Edward P. Warner, M.I.T., Frank P. Lahm and J. J. Ide also represented American interests. Many details and regulations covering races, etc. will be considered at the Prague conference.

The Aeromarine Starter

This Device Stores Energy in a Flywheel Which in Turn Is Applied to the Crankshaft

Among recent developments in aircraft auxiliary apparatus one which has created considerable interest is the Aeromarine Inertia Starter (built by the Aeromarine Plane & Motor Co. of Keyport, N. J.) This is a hand starter in which the cranking energy of the operator is not applied directly to turning over the engine crankshaft, but instead is used to start a flywheel rotating and bring it to a high speed. When the operator has stored sufficient energy in this flywheel, he stands away, free of all contact with engine or starting mechanism, and pulls a light control rod which connects the starting mechanism to the engine. This diverts the energy stored in the flywheel through a train of gears into turning over the engine crankshaft. A fraction of a minute is sufficient to store the required amount of energy for starting a 600 hp. aircraft engine, the length of time depending entirely upon the zeal of the operator.

High Initial Cranking Speed

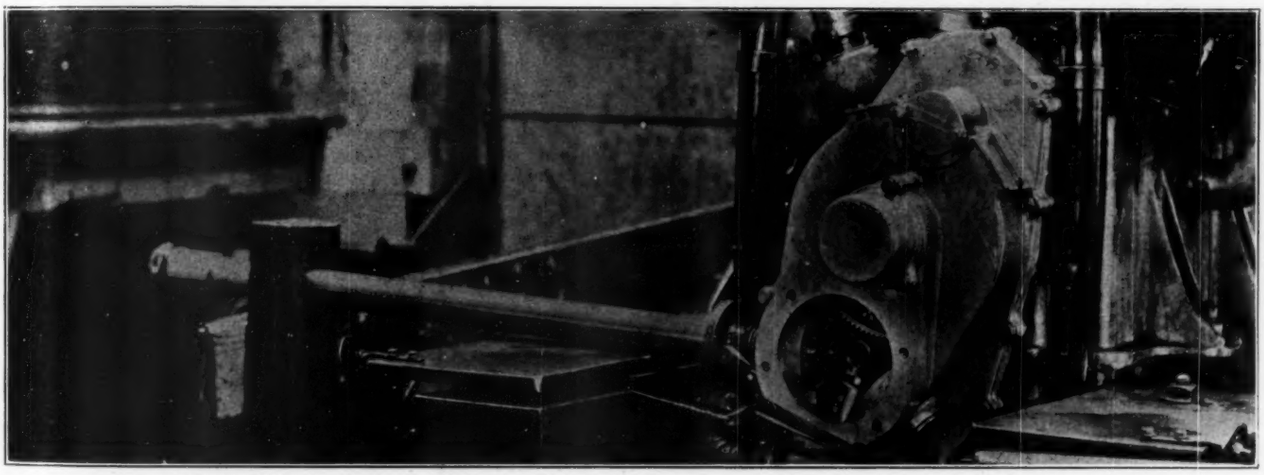
The flywheel starter excels other starting devices for aircraft engines, whether power operated or hand operated, in its initial cranking speed, which may be well over 100 r.p.m. While the starter only turns the crankshaft a few revolutions, this initial kick at high speed results in good distribution and compression, and makes it possible to easily start large engines directly on the magnetos even when cold and with the spark fully advanced.

In order to prevent any possibility of damage to the engine parts at the instant of engagement of the starter jaw with the companion jaw on the engine crankshaft, the device is provided with a specially designed overload releasing clutch which may be set to allow the development of a definite maximum torque at the crankshaft, and is capable of holding this setting indefinitely within very close limits. This clutch acts to absorb the shocks from backfires as well as during the initial engagement of the starter jaws.

Light High Speed Flywheel

The inertia starter will give the engine crankshaft from three to eight rapid turns, depending upon the stiffness of the engine, at a speed many times that of the electric or hand starters heretofore used. As many as twelve starts of a Liberty engine in normal running condition have been made with a single cranking of the flywheel. Its weight is about the same as the lightest electric starter without the storage battery, and it therefore represents a substantial saving in weight as against the electrical equipment as a whole.

When the suggestion of starting an aircraft engine by means of a flywheel was first brought forward, it created considerable amusement among those whose primary object in design is directed toward obtaining the lowest possible weight-power ratio. The term "flywheel" is always associated with something very heavy. This however, in the case of



The Aeromarine Inertia Engine Starter, showing hand crank and gear box

Another advantage which is greatly appreciated by the mechanics who have to start these engines, is that the operator can work with a smooth easy pull on the handle and take his time at the job of speeding up the starter flywheel. He is therefore not subjected to the severe strain required to turn a big engine over the compression peaks when the ordinary hand starter is used. Furthermore, when the actual start is made, he is entirely clear of the starting mechanism and free from all possibility of injury from backfires, etc. As a further precaution against any possibility of injury to the operator, a ratchet is provided on the hand crank shaft which is automatically disengaged by the same mechanism that connects the starter to the engine so that in case the operator should keep his hand on the hand crank while pulling the control rod he will still be unharmed should a backfire occur.

stored energy, depends entirely upon the speed at which it is possible to drive the flywheel, and as the stored energy increases as the square of the speed, it will be seen that by using a large gear reduction, a very small flywheel may be made to do a large amount of work. For instance, the flywheel in the Aeromarine Inertia Starter weighs only five pounds and is only five inches in diameter, but on account of its high rotative speed, it has a very large capacity for storing energy. It may be easier to imagine just how great this energy capacity is if it is considered that an equivalent flywheel without any gear reduction and two feet in diameter instead of five inches would have to weigh over 5,000 lb.—or more than 1000 times the weight of the Inertia Starter Flywheel.

The gear ratio used is 162 to 1 between the hand crank and

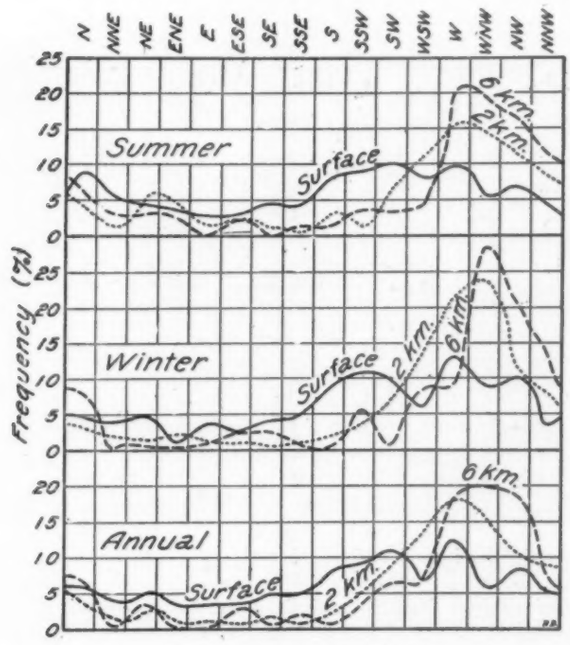
the flywheel, so that a hand crank speed of 100 r.p.m. turns the flywheel over at more than 16,000 revolutions per minute. The gear reduction between the flywheel and the engine crankshaft is slightly less (133) so that the starter jaw turns about 25 per cent faster than the hand crank.

This large gear ratio is obtained in the type of starter illustrated with two spur gear reductions, the second one involving the use of the Aeromarine standard five-tooth pinion. All gears are mounted on ball bearings and are of the Maag tooth outline, which makes for great strength and high efficiency. The meshing mechanism for connecting the starter to the engine is provided with a toggle spring which provides a very quick engagement and thus insures that the jaw teeth engage to the full depth and do not catch on the edges. The starter is mounted in an oil-tight cast aluminum casing and all external steel parts are finished in dull nickel.

The illustration shows the Type "A" Flywheel Starter as adapted to a Liberty engine. The installation is made through an adaptor plate which is interchangeable with starter units and may be left on the engine when removing or exchanging them. This makes it possible, by merely changing the adaptor plate, to have a standard unit which can be installed on any engine.

High Altitude Winds

The project of using supercharged engines in transport machines and flying at very high altitudes in order to take advantage of the high wind velocities at those altitudes has frequently been a matter for speculation. The Weather Bureau and the aerological services of both the Army and the Navy have been making regular observations of the winds aloft by means of pilot balloons for several years and sufficient data has been collected by various stations for conclusions to be drawn. C. L. Ray in the *Monthly Weather Review* for January, 1925, gives an analysis of approximately 2,100 such observations made at Lansing, Mich. His results show that there is a pronounced westerly trend in all seasons of the year at this station.



Winds aloft, Lansing, Mich.

The accompanying curves show the percentage frequency of the winds at the surface and at two representative altitudes. These curves show that there is a more pronounced effect in winter than in summer. Lansing lies close to the tracks of most of the cyclones that cross the country, with the exception of those that come up the Atlantic coast. The large percentage of days with precipitation or at least cloudiness and with strong winds associated with these storms renders the location unfavorable for the best results, so far as continuity of record and attainment of high altitude are concerned. Nevertheless, the total of 2,124 flights offers a satisfactory basis for the computation of average values.

The following table gives the mean free-air winds at various altitudes and for the different seasons.

	Spring		*Summer*		*Autumn*		*Winter*		*Annual*	
Altitude	*Direction*	*Vel. m.p.s.*	*Direction*	*Vel. m.p.s.*	*Direction*	*Vel. m.p.s.*	*Direction*	*Vel. m.p.s.*	*Direction*	*Vel. m.p.s.*
m.										
Surface	S. 75° W.	3.7	S. 85° W.	2.3	S. 61° W.	2.8	S. 74° W.	3.4	S. 74° W.	3.1
250	S. 87° W.	7.9	N. 78° W.	5.7	S. 75° W.	7.3	S. 84° W.	8.0	S. 87° W.	7.2
500	S. 88° W.	9.0	N. 78° W.	6.2	S. 80° W.	8.0	W.....	9.7	W.....	8.2
750	S. 88° W.	9.5	N. 74° W.	6.2	S. 79° W.	8.4	N. 84° W.	10.9	N. 88° W.	8.8
1,000	N. 79° W.	9.8	N. 72° W.	6.3	S. 82° W.	9.3	N. 81° W.	11.2	N. 82° W.	9.2
1,500	N. 74° W.	10.6	N. 71° W.	7.2	N. 89° W.	9.8	N. 75° W.	12.4	N. 77° W.	10.0
2,000	N. 75° W.	11.5	N. 67° W.	7.8	N. 85° W.	10.7	N. 74° W.	13.5	N. 75° W.	10.9
2,500	N. 74° W.	12.6	N. 68° W.	8.4	N. 84° W.	11.7	N. 74° W.	15.9	N. 75° W.	12.2
3,000	N. 65° W.	13.1	N. 65° W.	9.0	N. 82° W.	12.5	N. 69° W.	17.6	N. 70° W.	13.0
3,500	N. 67° W.	13.7	N. 60° W.	9.9	N. 81° W.	13.1	N. 70° W.	19.5	N. 70° W.	14.0
4,000	N. 67° W.	14.4	N. 61° W.	10.1	N. 82° W.	14.1	N. 69° W.	21.8	N. 70° W.	15.1
4,500	N. 64° W.	15.2	N. 60° W.	10.4	N. 77° W.	14.6	N. 61° W.	22.9	N. 66° W.	15.8
5,000	N. 68° W.	15.6	N. 60° W.	11.2	N. 72° W.	15.2	N. 57° W.	23.1	N. 64° W.	16.3
6,000	N. 66° W.	16.0	N. 58° W.	12.3	N. 67° W.	17.3	N. 57° W.	24.9	N. 62° W.	17.6

Night Photograph of New York

McCook Field pilots have been directed to prepare to make a night photograph of the City of New York. The attempt will be strictly a military experiment designed to show how much of the city can be photographed with a single flash, previous to the Mitchel Field air races in October.

It was said that the largest flashlight charge ever set off will be used. It will be suspended by an automatic device far below the bottom of the Martin bomber which will be used.

When the plane is directly above the heart of the city an electric spark will ignite the powder and when the flash reaches its zenith the camera will be snapped. This is the first time the Army has attempted to photograph a great city at night. On one occasion a picture of McCook Field was made, fifty pounds of powder being used.

CALENDAR OF EVENTS

Sept. 28 to Oct. 3	Reliability Tour for the Edsel Ford Trophy, starting and ending at Detroit.
Oct. 7	Aeronautic Meeting, S.A.E.
Oct. 8	Two Seater Free-for-All, Multi-seater Free-for-All, Liberty Engine Builders' Trophy.
Oct. 9	Mulvihill Model Trophy, Aviation Town and Country Club of Detroit Trophy, Dayton Daily News Light Airplane Trophy, Detroit News Air Transport Trophy.
Oct. 10	Scientific American Trophy, John L. Mitchell Trophy, Pulitzer Trophy.
Oct. 18	Beaumont Cup, France.
Oct. 24	Schneider Cup.
Oct. 24 to 28	Coppa del Mare, Naples.
Nov. 11 to 15	Coppa D'Italia, Rome.

Bombing Accuracy

Bombing with 80 Per Cent Hits Too Optimistic and Not According to Records - 23 per cent Average Performance

By MAJOR B. W. SIMPSON
Ordnance Department, U.S.A.

The following article was written as a reply to a letter from Capt. Norbert Carolin printed in AVIATION *in which he criticized an article by Secretary of the Navy Wilbur on "The Limitation of Naval Armament." Captain Carolin wrote: "I feel that I may correct several misleading statements in these articles dealing with aerial bombing, as I have dropped some 300,000 lb. of bombs myself. The discussion of the results of aerial bombardment during the World War is misleading, as the art has been so far developed since that time that there is little comparison with its 1918 status. As a matter of fact, no satisfactory bombs for use against marine objectives had been developed prior to 1920. The implication is made that 3 per cent hits may be expected when bombing battleships. Any bombing team that cannot register 80 per cent hits on such an objective from 9000 ft. should be returned to school for further training."*

The article by Major Simpson has been approved for release by the Chief of Ordnance.—EDITOR.

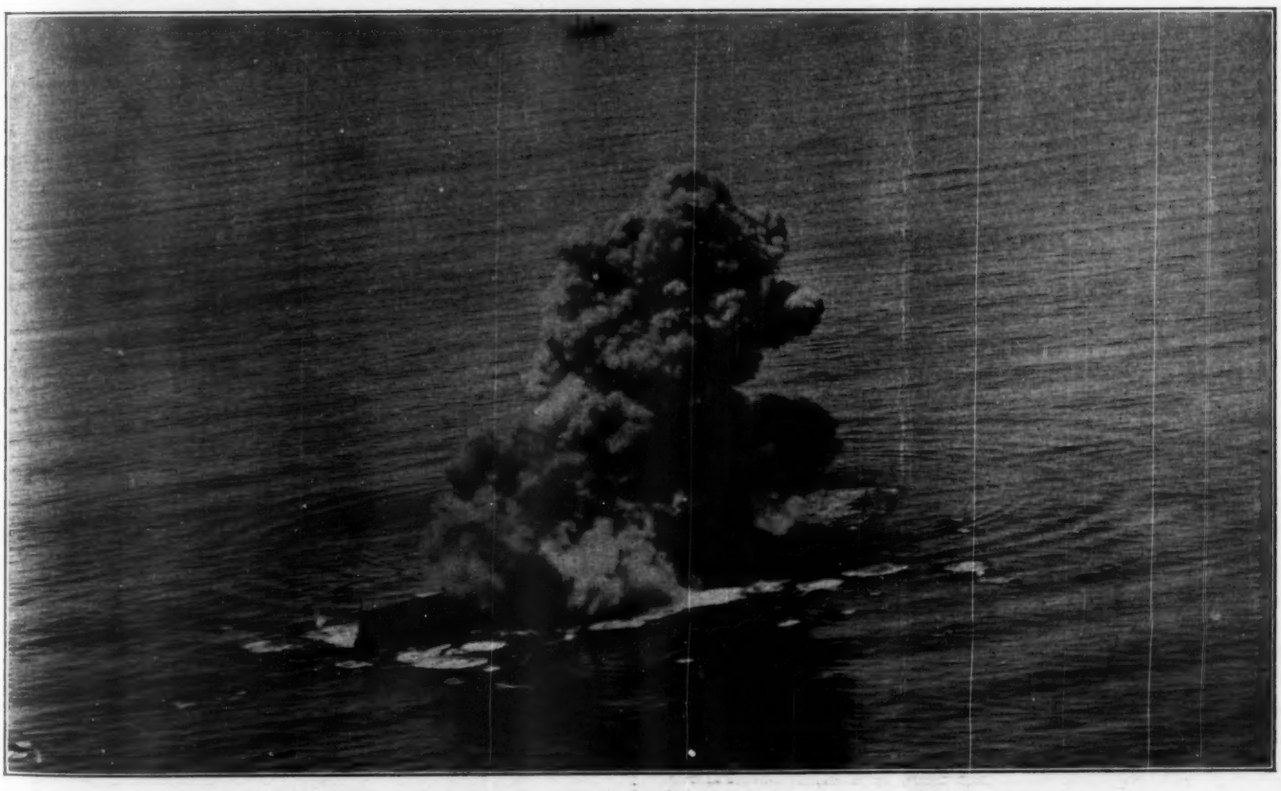
In AVIATION for July 20, 1925, there was published a letter from Norbert Carolin entitled "Bombing Facts" in which Captain Carolin makes the statement that "Any bombing team that cannot register 80 per cent hits on such an objective (a battleship) from 9,000 ft. should be returned to school for further training." This statement was emphasized by heavy type and was considered of sufficient importance to warrant special editorial comment.

While it is possible, of course, to obtain as high as 80 per cent hits on a battleship target such a performance would be remarkable to say the least and would be beyond the realm of probability. The excellence of training of a bombing team is more reasonably measured by its probability of hitting the target. This has been in actual tests considerably below the eighty per cent figure mentioned above for the altitude considered.

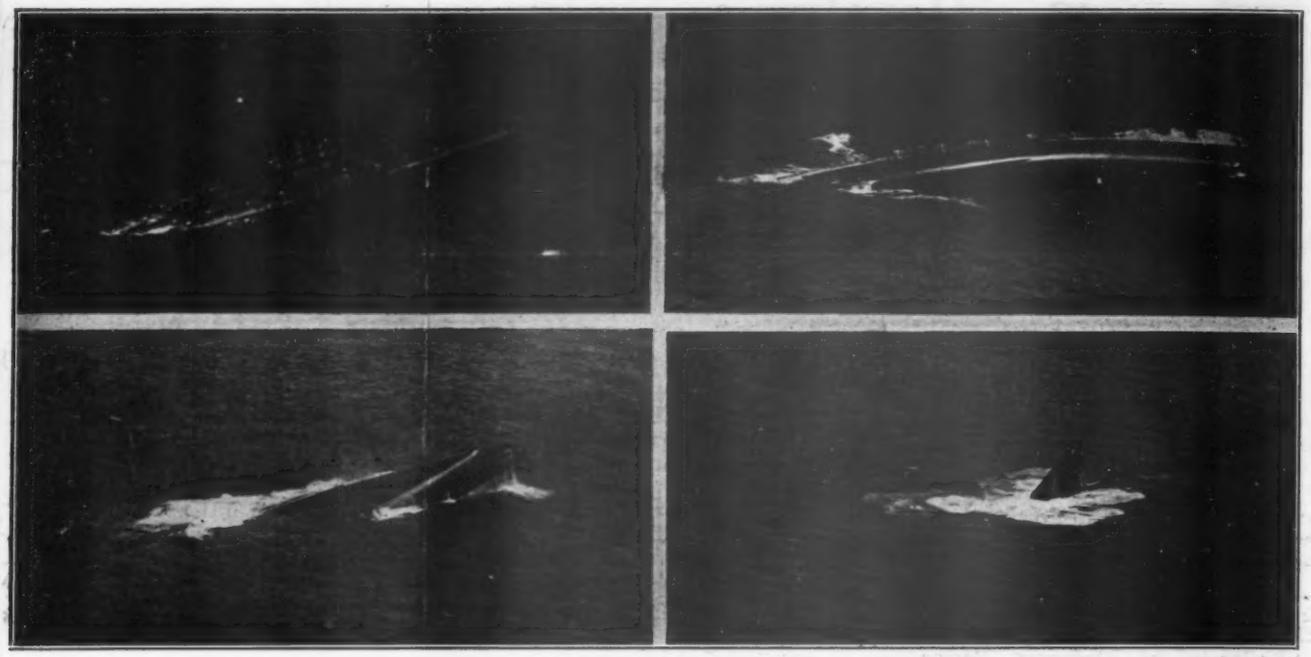
The Vulnerable Area

First let us consider just what area constitutes a battleship target. Various tests conducted since the World War have proven that such a target may be damaged not only by a direct hit on the structure of the ship but also by a hit in the water alongside the ship, the distance within which such a hit would be effective depending upon the weight of explosive in the bomb. This broadens out the target considerably and it is assumed that Captain Carolin is speaking of this broader target when he speaks of 80 per cent hits. This larger target for the largest type of bomb now standard will be considered in the following discussion.

In measuring the accuracy of gun fire or bombing the "probable error" of the fire is used. The probable error may be defined as the distance from the center of impact or center of gravity of a group of shots within which half of the group will probably be found. In other words, any individual shot or bomb has a 50 per cent probability of being within the probable error and an equal chance of being without the probable error. In the ballistics of guns it is usual to determine the probable error in range and the probable error in deflection and use these two errors to find the probability of hitting the target. The same method may be employed with



The Virginia after being struck by a 1100 lb. bomb



How the Ostfriesland Sunk
U. S. Navy Official Photograph

bombing but as the errors in range and deflection in bombing are essentially equal it is somewhat more convenient to use the "circular" probable error by means of which the percentage of bombs that will probably hit within a circle of a given diameter may be determined.

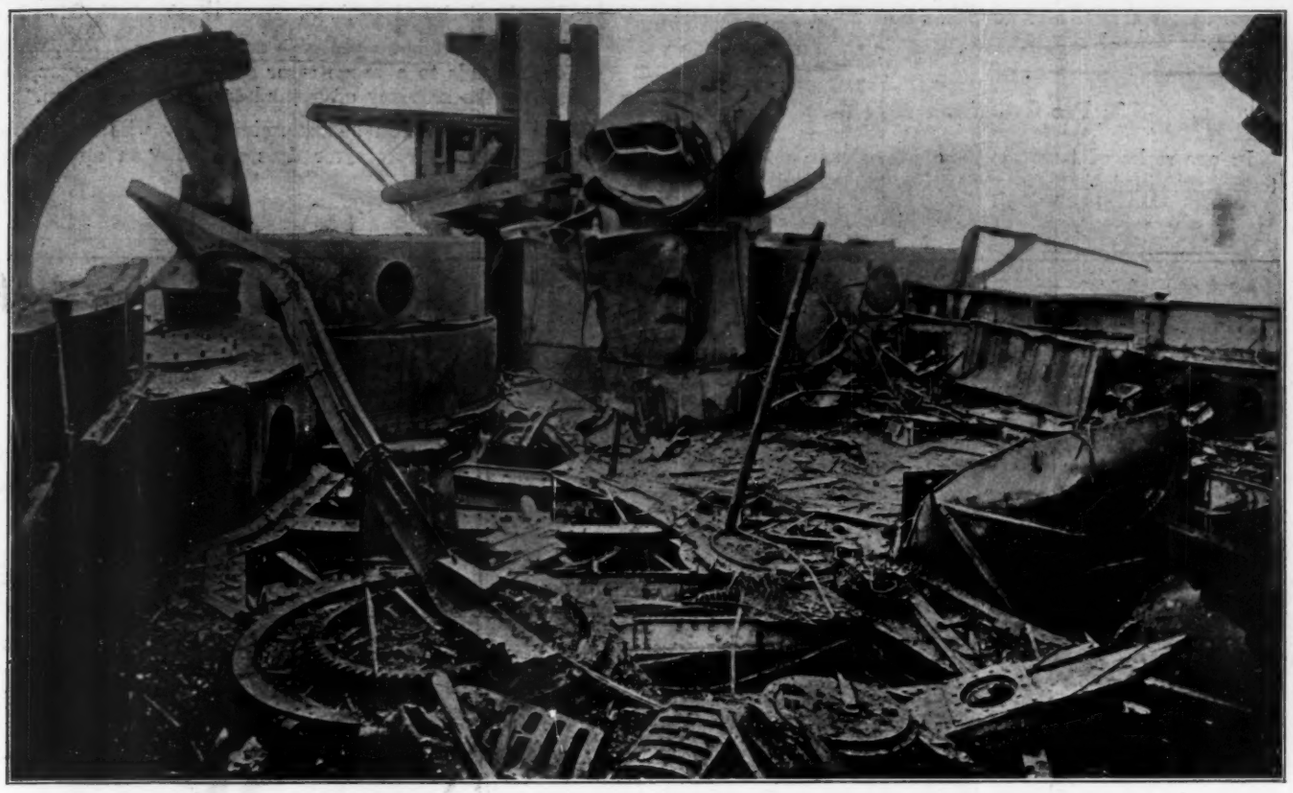
The probable error of bombing has been determined from various tests and is found to vary with the degree of training of the bombing team, the type of equipment used and the weather conditions under which the bombing was conducted. For instance, the probable error of night bombing in one test was found to be approximately twice as great as that for day bombing, although with proper illumination of the target night bombing can probably be conducted with almost as great a degree of accuracy as day bombing. Likewise, the probable error of an experienced team with the best equipment now available may vary considerably at times from the average probable error.

E. J. Loring, an authority on bomb ballistics, has discussed the subject at considerable length and after analyzing a large mass of data has proposed the following empirical formula for the probable error of bombing:

$$\text{Probable error (in feet)} = \frac{3\sqrt{\text{Altitude (in feet)}}}{K}$$

in which K is a factor or depending upon the degree of

These are probably the most remarkable airplane photographs ever taken of the sinking of a battleship. The explosion of a bomb deep under the New Jersey is shown thro and the after deck is seen to be burning. In a minute or two she rolls over and a little geyser of water is seen spouting from the holes in the bottom of her hull. The ster



Wreckage caused by anti aircraft bombs

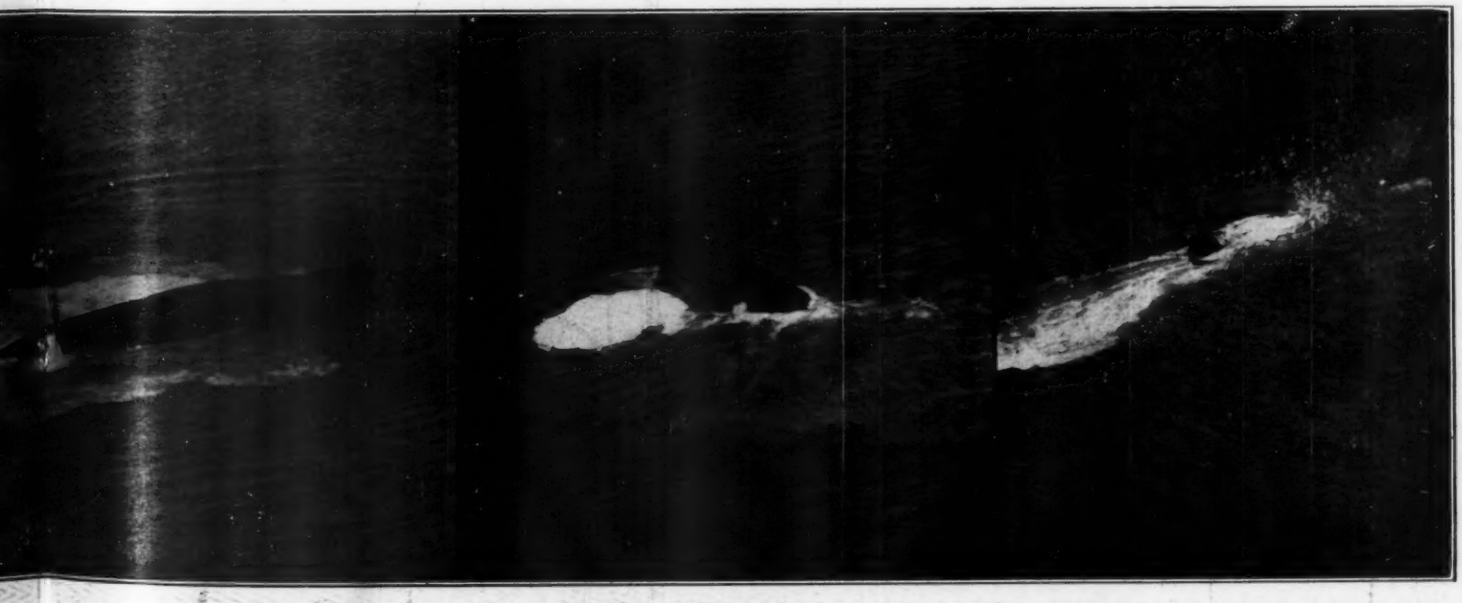
training of the bombing team or "figure of merit" of the team. Loring would rate teams according to the following table:

	K
Ultimate	2.5
Remarkable	2.0 or more
Excellent	1.5 to 2.0
Good	1.25 to 1.5
Average	1.0 to 1.25

Knowing the probable error it may easily be determined by calculation what percentage of hits may be expected on a given target. Loring finds the following percentages of hits may be expected on a battleship target from an altitude of 9000 ft.

K	*Rating of team*	*Direct Hits*	*Direct Hits and Hits in Danger Zone*
1.0	Average	11%	23%
1.5	Excellent	20%	39%
2.0	Remarkable	28%	53%

The results actually obtained in service day bombing correspond to those obtained by teams that would be rated as average with an occasional performance that would be called



sey is shown throwing water up on both sides of the ship and emitting a funnel of black gases and smoke. In the next picture the old battleship is listing badly to port er hull. The stern goes down first, raising the bow high in the air, and then the proud old ship slides almost vertically to its last resting place on the bottom of the sea.

excellent. We have had no remarkable or ultimate bombing so far.

32 Per Cent from 9000 Feet

In one series of tests the board of officers conducting the tests determined that the probability of getting a hit on a battleship of the "California" class was 32 per cent from 9,000 ft. altitude but in arriving at this result the board converted the area of the target to an equivalent square and determined the probability of hitting the square. Loring takes the actual shape of the target, approximately an ellipse and shows that the probability of hitting is nearer 23 per cent. In one of the battleship bombing tests two direct hits and four hits in the danger area, a total of six hits, were made on a battleship from a height of 10,000 ft., 25 per cent hits somewhat better than average results. This is considered very good bombing, though Captain Carolin would send all these teams back for further training. By all means let them have further training, the more of it the better, but do not let us delude ourselves that further training can raise the percentage of hits to anything like 80 per cent.

Static bomb exploding alongside U.S.S. Washington

Causes of Misses

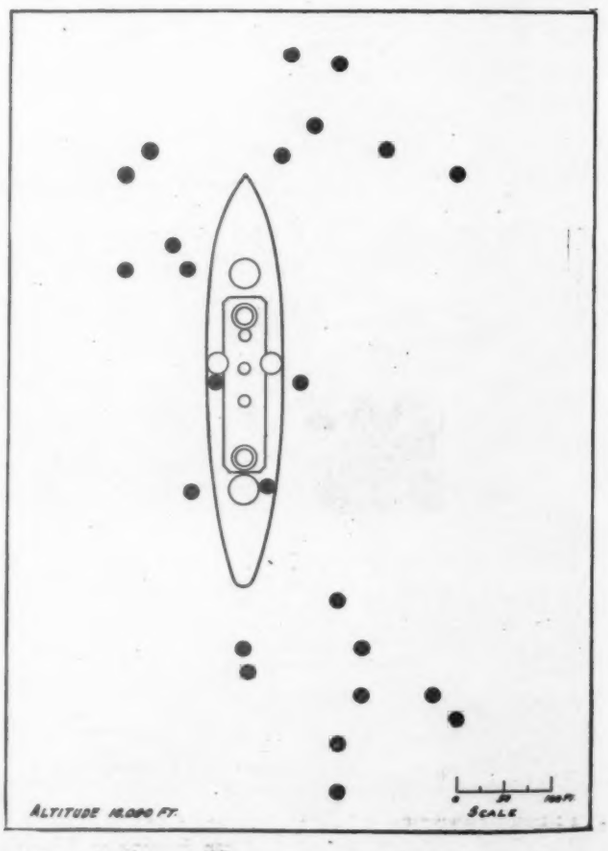
What causes the bomber to miss the target? A number of things are responsible, some of them within the control of the bomber and others that he cannot control at all. His bomb sight places the pilot on the proper course, measures his ground speed and corrects for it and indicates the instant for release of the bomb. Other instruments give him his altitude and air speed which are used in setting his sight. The bomber is responsible for aligning the pilot on the proper course, correctly setting the air speed of the plane and terminal velocity of the bomb, and the altitude of the plane on the sight, correctly measuring the ground speed, and releasing the bomb at the proper instant. The pilot must fly at the proper altitude selected for bombing, obey the signals of the bomber for direction and keep his plane on as level a keel as possible.

Probable Errors in Bombing

Correct setting of the scales of the sight may be assumed; errors in altitude, air speed and ground speed determination, direction of the course, level of the plane, and release of the bomb are inevitable. The bomb itself has an appreciable probable error even if dropped under identical conditions. Some of the errors beyond the control of the bomber and their effects at 9,000 ft. are as follows:

1. The bomb has a probable error of about 45 ft.
2. The altimeter has a probable error of over 200 ft., which corresponds to a range error of 40 ft. This error also affects the accuracy of ground speed determination.
3. The air speed can be determined only within an error of 5 m.p.h. This error does not have an appreciable effect on range.
4. The effect of wind is only approximately corrected for by the sight. A 10 m.p.h. wind will move the bomb about 20 ft.

If we add to these errors the errors of the bomber and the pilot we can see why 25 per cent hits from 9,000 ft. is not such a bad score. To claim 80 per cent hits is ridiculous and unnecessary and would only lead to erroneous estimates as to the number of bombers and bombs required to accomplish a given mission.



Airports and Airways

New England Notes

By Porter Adams

Last week the Army at the Boston Airport made twenty-five flights and flew 18 hr. 15 min. Lieut. Frank Crowley flew to Mitchel Field and return on Tuesday while Major Gilkeson flew to Edgeworth Arsenal on Wednesday and returned the following day. There was no National Guard flying at the airport as the National Guard unit is on two weeks active duty at Langley Field, Va., and is due to return Sunday.

The Navy made 107 flights with a total time of 62 hr. 18 min. In this time were included flights made by a number of Reserve officers at the station for their period of active duty at Langley Field, Va., and is due to return Sunday.

Mingled joy and regret attended the departure of Staff Sergt. George E. Schmidt of the Boston Airport this week when he went to Texas to begin training for a commission in the Regular Army Air Service. Ever since the opening of the airport Schmidt has been on the job there and, while all are happy that he has an opportunity to become a pilot, everyone is sorry to see him go. Schmidt entered the Coast Artillery at the outbreak of the war and stayed in the Regulars after the war, transferring to the Air Service in 1920 where he served, first at the old Framingham Field, and then at the Boston Airport. He holds a second lieutenant commission in the Air Service Reserve and, and at the time of his departure, was presented with a purse of gold from the Regular, Reserve and civilian personnel at the airport.

Schmidt was accompanied on his trip to Brooks Field by four other local men who will take the flying course as cadets. They are Private Arthur Wickford, of the Regular Army; Nelson H. DeFoe, Charles F. Sugg and Leonard M. Smith.

• • •

The funeral of Lieut. Arthur Reginald Houghton, U.S.N., of Brookline, Mass., who was an officer on the Shenandoah, was held at Boston on Monday, Sept. 7. The services were at St. Paul's Cathedral and burial was at Mt. Pleasant Cemetery. Lieutenant Houghton was buried with full Naval honors and the funeral procession consisted of a mounted escort of police, a Navy band from the Navy Yard, a company of sailors from the U.S.S. Utah, a color guard from the U.S.S. Cleveland, a platoon from the U.S.S. Detroit, and another platoon from the U.S.S. Florida. Among the Naval officers attending the service were Rear Admiral L. R. de Steiguer, commandant of the First Naval District; Comdr. H. D. Cook, his chief of staff; Capt. Yancey S. Williams, captain of the Yard; Capt. Christopher W. Ford, A.S., representing the Army.

• • •

On the same day D. D. O'Sullivan, aviation machinists mate of the Shenandoah was buried from the Church of the Sacred Heart at Lowell, Mass. The body was escorted by a company of blue jackets from the Navy Yard, a firing squad, and American Legion and Naval veterans. The body was drawn on a gun caission provided by Battery B of the 102nd Field Artillery.

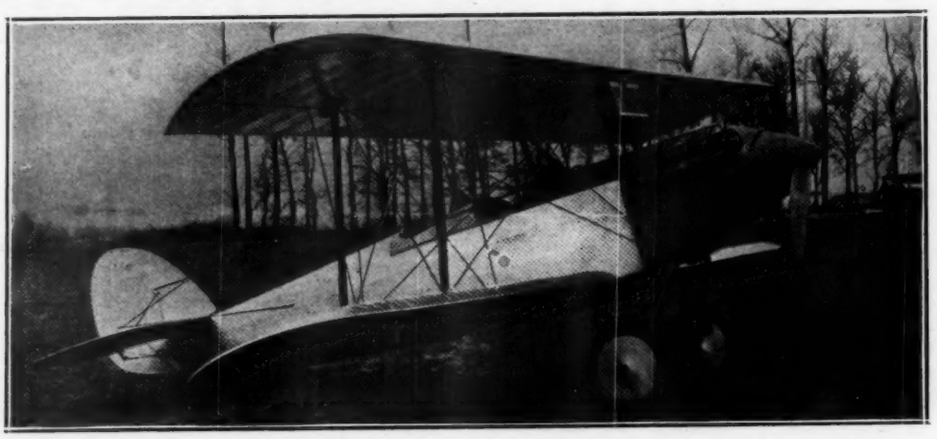
• • •

We're very sorry Bill Tipton doesn't like rhubarb pie, because we were going to bring him down one when we came to the Schneider Cup races. In fact we may bring one anyway because if it's as hard to get food at Baltimore during the races as it was during the last Army and Navy game we'll eat it ourselves.

Peoria, Ill.

Peoria has a large and well kept airport this year such as any city might be proud of, because of the active interest taken by the Association of Commerce of that city. For sev-

THE WACO NINE



THE PRODUCTION OF WACOS IS GREATER THAN THE COMBINED PRODUCTION OF ALL OTHER COMMERCIAL PLANES.

There is a Reason.

SHALL WE SEND THE BOOKLET?

THE ADVANCE AIRCRAFT CO. - - - - - TROY, OHIO.

eral years the field at Peoria has been kept up by a commercial company operating there. However, an increase in rents and the desire for a larger airport was causing this company to seek a better location when the Association of Commerce stepped in with a helping hand. This year the Association of Commerce pays half the rent on the field, and the largest company operating from the field pays the other half, the field being made a municipal one. No charge of any kind is made to Air Mail, Army or cross country fliers for the use of the field, and the result is that Peoria has been on the air map this summer as never before.

The Varney Aircraft Co. operating from the field have trained a number of students from all parts of the United States, and have done the largest passenger business in the history of the company this season. Mr. Varney says, "the improved field is largely responsible for the increase in their business, and an educational advertising campaign has done the rest. Instead of cutting our prices as most operators have done we have tried to build up confidence in aviation and have been well repaid. Fear, not the cost of flying, is the biggest obstacle in aviation, is our theory. Our slogan has been, 'Not how cheap we can fly, but how safe we can make flying,' and it has been bringing results."

Peoria wants to be placed on the Chicago-St. Louis mail route and has strong hopes that the wish may be granted. There are several reasons why Peoria should be considered. (1) Peoria is just half way between Chicago and St. Louis, which makes it a logical stopping point. (2) Peoria needs the mail service more than any other city between Chicago and St. Louis, as it has more than three times the mail coming in and going out than any other city on the route. (3) Peoria has a good airport available which can be used by any concern that gets the mail contract without extra cost.

Several students at the Varney School of flight who are building up their own machines will soon be ready to take the air in them. Paul Welscheimer has his 39B about ready to take the air. He took a day off last week and was married. He and his beautiful young wife expect to start for Florida on their aerial-honeymoon next week. Ed Leniniger put the center section on his Avro last Sunday. (The wings are not quite finished.) One very anxious lady watched him bolt the center section in place and then shook her head saying, "I believe I'd rather ride in one of the ships with the wider wings."

Russia

The following air lines are being operated at the present time in Russia.

Operating Companies	*Miles*
Oukrvozdouhpout	
Kharkov-Poltava-Odessa	360
Kharkov-Poltava-Kiev	261
Sebastopol-Jalta	50
Dobrolet	
Moscow-Ivano-Vozniessensk-Nijni	280
Bokhara-Khiva	261
Bokhara-Dichambe	242
Tachkent-Vernei (Acma-Ata)	398
Deruluft	
Moscow-Imolensk-Koenigsberg	746
Junkers	
Moscow-Kharkov-Rostov-Mineralneyado-Vode-Baki	1180
Zakavia	
Tiflis-Baki	298
Tiflis-Batum	155
Tiflis-Mineralneyado-Vode	199
Tiflis-Brivan-Djoulda	267
Total	4697

The following lines are in process of organization.

Oukrvozdouhpout	
Kharkov-Simpheropol	423
Dobrolet	
Moscow-Kharkov	404
Moscow-Ekaterinburg	882
Kazan-Saratov	423
Saratov-Astrakan	410
Total	2542

Decatur, Ill.

The Decatur Aircraft Company has just opened a new field which lies two miles directly west of the city on the

AIRPLANES FOR SALE

We have 333 airplanes that we must sell this year including Standards, Jennies, Canucks, Orioles, D.H.'s, Spads, T.M. Scouts and others. We have a large number of Standards, Jennies and Canucks set up, test flown ready for immediate fly away delivery. Come and take your pick.

NEW STANDARD J-1 AIRPLANES with guaranteed overhauled Hispano-Suiza motors, 150 H.P. $1500.00
NEW STANDARD J-1 AIRPLANES with new OXX6 motors 1300.00
NEW STANDARD J-1 AIRPLANES with Government overhauled OXX6 motors 1100.00
NEW STANDARD J-1 AIRPLANES with new OX5 motors 1000.00
NEW STANDARD J-1 AIRPLANES with Government overhauled OX5 motors 900.00
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These airplanes come complete with tools and instruments and the front seat is built so as to accommodate two passengers. These airplanes have been reconstructed and new longerons, new controls, new wires, new struts, new fittings, new instruments were installed where needed.

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NO BOND REQUIRED FOR SOLO FLIGHTS AND NO CHARGE FOR BREAKAGE

$100.00

ROOM AND BOARD NEAR FIELD AT $10.00 PER WEEK

The splendid response to this special offer (originally limited to June, July and August) permits us to extend it until further notice.

We will guarantee to teach a student to fly and successfully operate an airplane by himself, regardless of the number of flying hours required, and further, to furnish an airplane, free of charge, for the period of one hour for practice flights.

The flying school of the Robertson Aircraft Corporation is one of the oldest and best known in the United States. All of the instructors are ex-army aviators with wide experience and the equipment is the best that money can buy. The flying field is approximately six miles from the city of St. Louis and is easily accessible by railroad, street car and hard surfaced roads. It is the largest and best privately owned field in the country and the International Air Races of 1923 were held there.

Our course includes thorough flying training as well as complete instruction in the over-haul, care and maintenance of both the airplane and motor. The time within which one can learn to fly, varies with the individual; eight to ten hours of dual instruction, stretched over a period of ten days to two weeks should complete the most stubborn case, and from then on, the refinements of the art can be gained only from experience. Commercial aviation is a rapidly growing industry. Don't delay! Enroll now!

ROBERTSON AIRCRAFT CORPORATION

ST. LOUIS FLYING FIELD, ANGLUM, MO.

paved road. The field has a north and south runway 2,640 ft. long and an east and west runway 1,320 ft. long, both runways being 600 ft. wide. It is well sodded and drained well at all times. The field is equipped with hangars, gas and oil pumps, and marked with a large circle and wind cone and has no obstructions from any approach. It has been listed with the government airways and service and supplies can be had at all times, day or night. There has been an in-field built surrounding the hangars which gives ample room for open parking and protects the ships from sightseers.

Visiting ships are at all times welcome. No charges are made for the use of the field and transportation to and from the city can be had either by interurban, bus or company motor cars.

Inauguration of Air Service in Bolivia

American Minister Jesse S. Cottrell, La Paz, July 22

The German committee for the Bolivian Centennial has arranged for the presence at La Paz of a Junker airplane, which some time ago was reported as having arrived at Arica en route to that capital. This plane is later to form a part of a regular passenger and mail air service between Cochabamba, Sucre and La Paz, in which a total of eight planes will be used.

The business administration of this undertaking is in charge of the director of aviation, who is reported to have been one of the organizers of the "Scadta" air service operating between Cartagena and Bogota in Colombia.

Garden City, L. I.

The many friends of Mazel M. Merrill for the past four years associated with the Curtiss Companies at Dallas, Tex., and Garden City, Long Island, will be pleased to learn that he had returned to the Garden City field after a successful operation performed on his leg two weeks ago at the New York Hospital, New York City, by Dr. Hitziot, a specialist in orthopedic and bone surgery. Last May while landing an amphibian plane over Long Island Sound an obstruction caused the plane to nose down which resulted in the accident. The splintered leg was set immediately, but an infection which developed made a second operation and resetting necessary. It was with much pleasure that "Merry" was welcomed back by the boys at the Field even sooner than was expected. Mr. Merrill who has been in charge of operations at the Field since early spring says that "Day by day in every way the old leg is getting better and better" and that before long he hopes to be taking to the air again.

As courtesy to the New York Police Department who were holding their annual Police Games at the Jamaica Race Track on Saturday, Sept. 12, three Oriole planes from the Curtiss Flying Service, Inc., added to the program of the day by flying over the field in military formation. Flying from the Garden Ciey field the three Oriole planes circled three times over the heads of the 30,000 people assembled at the Jamaica track opening and closing their formation at various altitudes. The forward plane was flown by "Casey" Jones while the other two planes were piloted by W. H. McMullen and A. L. Caperton. All three planes carried two passengers each.

Ray Moore, also of the Curtiss Flying Service, Inc., performed for the crowd by making a parachute jump from a Standard plane piloted by J. P. Andrews flying at an altitude of 1000 ft. Moore, who is one of the best jumpers in the country did a slip off jump and so skillfully manipulated his chute that in spite of a strong wind he landed directly in front of the grandstands.

Immediately after the Police Games Pilot Andrews had the pleasure of giving Police Commissioner Enright and Honorary Commissioner Scott a flight over New York City bringing them back to Mitchel Field where they were received by Lieutenant Colonel Foulois. A Standard plane was used.

As a publicity stunt in opening up two new stores and announcing the Fall opening of a third, the Roxy Clothing Company operating a chain of men's clothing shops, employed the services of the Curtiss Flying Service, Inc., on Saturday, Sept. 12, to broadcast circulars from the air over their stores

STANDARD J1 AIRPLANES

UNTIL NOV. 1, 1926

We will sell New Standards, less Motor at $650.00. Deliveries will be made in sequence as orders are received. Act quickly as we only have a limited number that we want to dispose of at this price. Wire or mail your order with one-third deposit. The stock of Standards in the country is getting very low. By next summer they will be hard to get at any price. Place your order now and we will make delivery any time up to May 1, 1926. No storage will be charged on your ship. Quick action will assure you a good ship next summer. You will never buy one cheaper. These ships have never been flown.

New Catalogue Ready for Mailing. Write for One

SPECIAL BARGAINS ON OX5 — OXX6 AND HISSO PARTS

NICHOLAS-BEAZLEY AIRPLANE CO.

MARSHALL, MISSOURI

LARGEST STOCK IN THE UNITED STATES

in Jamaica, L. I., 3rd Avenue and 59th Street, New York, and Newark Avenue and Grove Street, Jersey City.

Newspaper advertising prepared each community for the event stating that a certain time a plane bearing the words "Roxy Clothes" on the under wings would distribute circulars from the air. Each circular bore a number and among those thrown out were a certain number of lucky ones which upon redemption at a Roxy store entitled the holder to the best suit of clothes or overcoat the house afforded free. To complete the advertising tie-up it was necessary for the recipient of each circular to go to the clothes shop and consult the list of lucky numbers posted on the store window to see if he were a winner. So successful was the publicity directed to the store by this method of advertising that D. Tarshes of the Roxy Company looks forward to using the stunt monthly as well as in connection with the opening up of each new store.

Otto Enderton, formerly connected with the U. S. Air Mail flying out of New Orleans, La., has joined the Curtiss Flying Service, Inc., at Garden City, N. Y.

On Monday, Sept. 14, "Casey" Jones in a Curtiss Oriole plane piloted Eddie Rickenbacker and Lieut. Col. Benjamin D. Foulois to Washington to extend a personal invitation to President Coolidge to attend the Air Races at Mitchel Field next month. The invitation was extended to the President on a silver plate mounted on a wind test model of the Army V1400 racing plane which is to be flown in the speed races. It is understood that the President thought so much of the model plane presented to him that after having his picture taken with it he ordered it placed on his desk in the Executive Offices.

Work on the new Curtiss Lark plane is nearing completion and will probably be ready for its initial test in the air some time soon. It is planned to put this plane in the Ford Tour on Sept. 28 and will probably be flown at this time by "Casey" Jones.

Miniature Aircraft Fliers

By Terence Vincent

In a duration contest held in the Chicago Municipal Pier auditorium on Sept. 26 six members of the Miniature Aircraft Fliers were selected as being qualified to represent the Chicago Junior Aviators at the International Air Races.

The Chicago Y.M.C.A.'s are paying the board and room expenses of two M.A.F. champions in New York during the races. Last year two lads were sent, with all expenses paid, to and from Dayton. One of them was flown with Pilot Partridge on his non-stop voyage from Ashburn Field.

Terence Vincent of 53 W. Jackson Blvd., Chicago, is the director of the M.A.F. Annual tournaments have been held for the past three years. The last tournament was held on May 9 and there were over 350 different contestants participating.

Indiana, Landing Fields

Information has been received regarding two new landing fields in Allen County, Ind., located directly north of Fort Wayne.

Field No. 1, known as Baer Field, is the municipal landing field for the City of Fort Wayne. It is located 4½ mi. due north of Fort Wayne; is marked by a "T", and is easily picked up from the air.

Field No. 2, known as Flight "B" Field, is approximately two miles due north of Fort Wayne, in a direct line between the city and Baer Field. It is considerably smaller than Field No. 1 and is also marked by a "T". It is bordered on the west by the F. W. & N. Railroad. Both fields are good landing fields.

Cleveland, Ohio

A complete sewerage and drainage system is being installed at the Cleveland Airport, Cleveland, Ohio. This work will be in progress during the balance of September and the first fifteen days of October. Either the east and west or north and south runways will be kept clear and available for landing, however, pilots landing at this field should look it over very carefully before landing and determine which runway is clear.

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(FIVE PASSENGER)

LIBERTY 12

TOURIST

Standardized D.H. parts assure easy replacements. New latest improved high compression Liberty 12 motor—gear pump positive feed gasoline system; also 7 gal. gravity tank. Dual control side by side in rear cockpit—adjustable horizontal stabilizer.

Weight, including passenger load	3800 lbs.	Wing area	548 sq. ft.
Spread	44′	Useful load	1200 lbs.
Length	29′ 5″	H.P. loading	9½ lbs. per H.P.
Chord	7′	Wing loading	6.9 lb. per sq. ft.
Gap	6′ 6″	Cruising radius	600 miles
Height	10′ 9″	Ceiling	18000 ft.
Dihedral	1½°	Landing speed	40-45 M.P.H.
Angle of incidence	2°	Maximum speed	120 M.P.H.
Wing	RAF 15	Wheels and Tires	900 x 200

Complete with all instruments, ready to fly at our field, price $8,500.00

Johnson Airplane and Supply Co.

DAYTON, OHIO

WRITE FOR OUR NEW PRICE BULLETINS. READY NOW.

United States Air Forces

U. S. ARMY AIR SERVICE

D.S.M. for World Fliers

On Friday afternoon, Aug. 14, at 4:30 p. m., the troops, consisting of officers of the Rockwell Air Intermediate Depot, the 91st Aero Squadron, and the Reserve Officers in Camp, were paraded on the field in front of the Officers' Club and the Distinguished Service Medal awarded by Congress was presented to Capt. Lowell H. Smith and 1st Lieut. Erik H. Nelson for services performed in connection with the World Flight, which was in command of Captain Smith.

Lieut. Col. Harry Graham, commanding officer of the Rockwell Air Intermediate Depot, made the presentation, which was witnessed by a large crowd of citizens from Coronado and San Diego.

Enlisted Men as Flying Cadets

Enlisted men of the Army Air Service to the number of twenty-one and three from other branches of the Service have qualified for appointment as flying cadets and have been ordered to Brooks Field, San Antonio, Tex., reporting upon arrival to the Commandant of the Primary Flying School not later than Sept. 10 for appointment as flying cadets, viz:

Private, 1st Cl. Ralph T. Wickford, Boston Air Port; Corp. Arthur E. Derby and Privates Herman E. Buchheim and Burdette C. Hughes from Langey Field, Va.; Privates Harry I. Downes, Arthur G. Benson, Ford J. Lauer, Clare E. McClure, Charles L. Nichols and Louis R. Zeamans from Chanute Field, Ill.; Corp. Harold C. Beedle, Privates Roy Judson Caswell, Ernest H. Lawson, Harold F. Payton and Dan F. Voorhees from Scott Field, Ill.; Privates William Garrett and Otto C. George from Air Service Det., Ft. Leavenworth, Kans.; Privates Russell G. Parker and Vaughan T. Ward from Kelly Field, Tex.; Privates Howard Franklin Jones and James M. Morrison from Crissy Field, Calif.; Private Moss Leslie Harris, 2d Div. Train, Q. M. Corps Ft. Sam Houston, Tex.; Private Harold A. Wheaton, Troop E, 2d Cavalry, Ft. Riley, Kans.; Private August J. Hurgon, 6th Signal Service Co., Scott Field, Ill.

Graduates Assigned

Twenty-eight second lieutenants of Air Service, scheduled to graduate from the Advanced Flying School at Kelly Field, San Antonio, Tex., on or about Sept. 15, have been assigned to duty at Air Service stations, as follows: To Kelly Field—Earle E. Partridge, Edward F. Booth, Alexander G. Greig, Irving B. Greene; to Langley Field, Va.—Robert L. Brookings and John R. Hawkins; to Phillips Field, Aberdeen, Md.—George H. Steel and James Hewins, Jr.; to Selfridge Field, Mt. Cleemns, Mich.—John J. Williams, Luther S. Smith, Carl J. Crane, John R. Armstrong, Lawrence C. Elliott, and Kirtley J. Gregg; to Marshall Field, Fort Riley, Kans.—Ralph E. Fisher; to Mitchel Field, L. I., N. Y.—Walter C. White, Albert F. Glenn, Denis J. Mulligan and Harold C. King; to Post Field, Fort Sill, Okla.—Kenneth C. Strother, Cornelius W. Cousland, and Glen L. Davasher; to Biggs Field, Ft. Bliss, Tex.—Lloyd E. Hunting; to Fort Sam Houston, Tex.—Leslie P. Holcomb; to Bolling Field, D. C.—Thomas D. White and Ralph H. Lawter; to Maxwell Field, Montgomery, Ala.—William D. Old and George A. Whatley.

Army Air Orders

First Lieut. Silas C. Hyndshaw, A.S., Los Angeles, to Letterman General Hospital, San Francisco.

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SWALLOW

The Aristocrat of the Air

PRICE REDUCTION

Immediate Delivery

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WICHITA, KANS.

UPSON AIRSHIPS
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AIRCRAFT DEVELOPMENT CORPORATION

Pioneers in Metalclad Airships

DESIGNERS AND BUILDERS

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AIRSHIPS for Military, Commercial and Private Use, Forest Patrol and Other Service.

MILITARY OBSERVATION BALLOONS, Racing Free Balloons and Other Lighter-Than-Air Equipment.

MOORING TOWERS for Airships. Designers and Builders of Ford Airship Mooring Tower at Dearborn, Michigan.

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GUARANTEED PERFORMANCE

	OX-5 Motor	C-6-A Motor
High Speed	90 m.p.h.	112 m.p.h.
Landing Speed	40 m p.h.	43 m.p.h.
Climb first min.	500 ft.	1000 ft.
Pay load	350 lb.	500 lb.

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The strongest ship designed for the OX-5 motor since the Jenny.

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BY

E. C. VIVIAN

We have just a few copies left of the above.

The retail price is $3.00, with the first ten new or renewal orders, $2.50 with subscription. This work is divided into four parts: The Evolution of The Aeroplane; Progress in Design; Aerostatics; Engine Development. There are 521 pages with numerous illustrations of photographs and diagrams.

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225 FOURTH AVE., NEW YORK, N. Y.

Capt. Frederick F. Christine, A.S., Fairfield, to Middletown, Penna.

Capt. Oliver P. Echols, A.S., Washington, to Bolling Field.

Sec. Lieut. Harold Albert Lidster, A. S. Res., San Antonio, to active duty Brooks Field, reverting to inactive status March 15.

First Lieut. Victor H. Strahm, A.S., Middletown, to Selfridge Field.

Tech. Serg. Arthur J. Teller, A.S., retired at Crissy Field.

Capt. George Edward Stratemeyer, A.S., promoted to rank of major.

Stanley Aubrey Clark, A.S. Res., Washington, to active duty with Ch. Air Serv., reverting to inactive status Sept. 28.

Priv. Harold G. Hoover, A.S., Bolling Field, transferred to Med. Dept., Walter Reed Gen. Hosp.

Priv. Russell E. Richardson, Med Dept., Walter Reed Gen. Hospital, Washington, transferred to A. S., Bolling Field.

First Lieut. Wendell B. McCoy, A.S., Brooks Field, to Maxwell Field.

First Lieut. Alonzo M. Drake, A.S., Mitchel Field, to Washington.

Sec. Lieut. Charles Arthur Ross, A. S. Res., Los Angeles, to active duty Brooks Field, reverting to inactive status March 11. Spec. Or. 194, relating to Lieutenant Ross revoked.

First Lieut. LeRoy E. McGraw, A.S. (Inf.), relieved from duty Scott Field and assigned to 6th Inf., Jefferson Barracks.

Sec. Lieut. James M. Callicutt (Field Art.), A.S., Brooks Field, to Kelly Field.

Capt. Louis George Meister, A.S. Res., Dayton, to active duty Mitchel Field, reverting to inactive status Oct. 13.

Sec. Lieut. Albert Lewis MacClain, A. S. Res., Seattle, to active duty San Diego, reverting to inactive status Oct. 4.

Spec. Ord. 202, relieving Sec. Lieut. Robert L. Brookings, A.S., Kelly Field, and directing Lieutenant Brookings to proceed to Langley Field, revoked. Lieutenant Brookings is relieved from assignment and duty Kelly Field and will proceed to Chanute Field.

Spec. Ord. 188, directing First Lieut. John Y. York, jr., A. S., to report to Com. Off., Scott Field, amended to direct Lieutenant York to report to Com. A. S. Bal. & Airship Sch.

Illinois Reserve

By Robert McKnight

Under the command of Capt. Joseph L. Whitney, A.S. Res., of Chicago, thirty-five reserve officers from the State of Illinois were mobilized at Chanute Field and underwent military training for the period from Aug. 16 to Aug. 30. They drilled. They shot at targets. They flew. They studied engines. They studied radio. But above all they governed themselves. They maintained their own headquarters, kept their own records, issued their own orders, and their own officers performed all of the administrative functions of the unit.

This unit is the 319th Group (Attack), comprising the 467th, 468th, 469th and the 470th Attack Squadrons, which, with the 308th Pursuit Group and the 309th Attack Group makes up the 9th Wing, commanded by Major Philip G. Kemp of Chicago. The 308th Pursuit Group was in camp at Selfridge Field during this period. Major Kemp and his Adjutant, Capt. Eben Stanley, divided their time during the 15-day period between Selfridge and Chanute Fields, traveling, of course, by plane, in supervising the work of the two groups under their command.

The personnel of the 319th group flew 400 hr. and in that time but one slight accident occurred—a propeller was broken in landing in high grass and the plane was out of commission only long enough to put on a new stick.

Capt. Frederick M. Byerly commands the 469th Squadron with 1st Lieut. Velie L. McElvain as adjutant. Capt. Roy B. Mosher commands the 470th with 1st Lieut. Ralph E. Brown as adjutant. Regular Army instructors tested the reservists and all of the latter were soloed after short check trips. The first week was devoted to formation flights and solos near Chanute Field.

Cross-country flying varied the second week. On Aug. 25 a formation of three Curtiss JNSE planes with 1st Lieut. Calvin L. Workman as flight commander, Major Thornton A. Mills, Capt. Roy B. Mosher, 1st Lieuts. Richard M. Biil and

Enoch O. Paulsen, and 2nd Lieut. Moritz H. Finger flew to McCook Field, returning to Chanute Field, Aug. 26.

On Aug. 26 another formation of three ships flew to McCook Field and returned the following day. 1st Lieut. John C. Henderson, commander, 1st Lieuts. Thomas P. Sobota, Marlin C. Moore, Alfred C. Carrier, and 2nd Lieuts. John L. Parkhill and Carl R. Russell made up the personnel of the flight.

Capt. Kenneth T. Price commanded the three planes which were flown to Camp Grant on Aug. 27 to participate in the maneuvers of the 33d Division, National Guard, and with him were Major Thornton A. Mills, 1st Lieuts. J. Kendall, S. Mitchell, John S. Gibbons, Frederick E. Knocke, and 2nd Lieut. Royal D. Baysinger. This flight returned on Aug. 28.

To Canton, Ill., and back flew three planes on Aug. 28, carrying Capt. Charles W. Richards, 1st Lieut. Olin L. Day, 2nd Lieuts. Weikert, Joseph E. Teberek and John H. Reed, Sec. Lieutenant Weikert was the commander of the flight.

"These cross-country flights were made on scheduled time," recited Captain Whitney in his report to his Wing Commander, "and were accomplished with 100 per cent efficieney. They had a most stimulating effect upon the officers in camp and did much to enthuse them in reserve activities. Capt. Kenneth T. Price is operations officer and 1st Lieut. Calvin L. Workman, his assistant."

In his special report of the shooting practice, Captain Whitney urged that at the next camp of his group, provision be made for the actual dropping of small fragmentation and dummy bombs and the actual shooting of machine guns from planes upon designated targets. He believes that this will be valuable added training.

Follow some additional statements and observations from the commanding officer's report:

"It would be desirable to have a few of the latest service attack planes at our disposal at the summer camps. We should fly our tactical problems in modern equipment, simulating, as nearly as possible, actual conditions in time of emergency, although, in the absence of modern service types, the Curtiss JNSE is a satisfactory training and cross-country plane for our purposes."

New Air Service Uniforms

As Exhibits A and B of the new Air Service uniform, Brig. Gen. James E. Fechet, Assistant Chief of Air Service, and his aide, Capt. Ira C. Eaker, U.S.A., appeared at the War Department on Sept. 11 in the new outfit with the specifications and interviewed the Assistant Secretary of War and the Chief of Staff. The younger officers in the War Department were enthusiastic over the smart appearance of the new uniform.

The distinctive feature of the new coat is the cloth belt around the waist. With it and the increased length of an inch and a half, the tailor was able to give the skirt of the coat a very large flare effect. The tailor explained that the belt was absolutely necessary to cover the seam around the waist, which, to give the skirt the flare, extends obliquely around the waist.

Assistant Secretary Davis, after looking the uniforms over, ordered some changes in the location of the devices indicating the branch of service, and other minor changes. After these changes are made, he declared that he would approve the regulations and specifications.

Collecting Spores

McCook Field fliers have been called into service against the deadly grain disease known as stem rust. A series of flights was recently completed by Lieut. James T. Hutchinson, accompanied by an observer, who carried with him a number of glass slides covered with a gelatinous substance. At different altitudes the observer exposed these slides to the air, the idea being to collect the rust germs on them and send the slides to the Bureau of Plant Industry, U. S. Department of Agriculture, to determine at which altitude the rust germs are more prevalent and trace the source of same from the knowledge of the prevailing direction of air currents at various altitudes. Through these flights it was also sought to determine from day to day the number of rust spores floating in the air, to show their first appearance in the air and ascertain the connection between air currents and the spread of the germs.

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CHARLES GREY
Editor

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It is the purpose now to have slides made at all flying fields and so determine in what part of the country the spores are most abundant.

U. S. NAVAL AVIATION

Aircraft Carrier Lexington to be Launched

The Navy's second aircraft carrier, the Lexington, will be launched on Oct. 3, 1925, at the Fore River Shipyards, Quincy, Mass. Mrs. T. Douglas Robinson will act as sponsor.

The Lexington is a sister ship to the U.S.S. Saratoga launched at Camden, N. J., on April 7, 1925, which ship was fully described in the April 20 issue of AVIATION. The dimensions of the two ships are the same as are also their motive power and equipment. Each ship will be able to carry to sea seventy-two of the most modern airplanes, providing the fleet with a valuable arm of offense and defense.

The over-all length of the Lexington will be 888 ft. Her beam will be 105 ft. Electrically driven, as are our latest battleships, she will have a speed of 33 knots. Her displacement is 33,000 tons.

As will be remembered that the Lexington and the Saratoga were originally designed for battle cruisers and were changed to airplane carriers as a result of the Limitation of Armament Treaty which made the scrapping of the other four battle cruisers compulsory, but permitted the United States to convert two of the six into aircraft carriers.

The motive power is derived from four 45,000 hp. motors. Electricity is generated by eight 22,500 kilowatt turbine generators. The entire electrical plant was constructed by the General Electric Company of Schenectady, N. Y. The combined horsepower of our six electrically driven battleships is not as great as that of this single ship. In addition to the main motors and generators the General Electric Company has supplied all the auxiliary motors driven by turbine generators. These motors will be used for steering the ship, for anchor windlasses, potato peeling machines, ventilation, and elevators, and for driving a number of the auxiliary machines.

The Lexington will be equipped with the most modern of radio equipment. A single antenna will lead to the deck from a topmast so tall that it will have to be lowered to pass under the Brooklyn Bridge.

The armament will consist of eight eight-inch guns, mounted in four turrets, and of anti-aircraft and machine guns.

The Lexington was authorized by Congress in 1916. The original contract was let just before the entry of the United States into the World War, but work on her was delayed in order to facilitate the rapid completion of smaller types of vessels, notably the destroyers which were so effective in reducing the German submarine menace to absolute zero.

While the under water hull originally planned has been to a great extent retained, all the upper part of the ship was redesigned by the Bureau of Construction and Repair of the Navy Department, and the Lexington and Saratoga will be the most modern and fully equipped aircraft carriers afloat when they are completed, late in 1926. The entire ship is given over to the peculiar requirements of a large naval aviation force consisting of bombers, fighting scouting, torpedo and observation planes.

The Lexington will be the heaviest ship ever launched in the country, being about 2000 tons nearer completion than the Saratoga when she was launched in April.

Navy Air Orders

Lt. Osborne B. Hardison det. Aircf. Sqdns., Sctg. Flt., to temp. duty Army Air Sta., Selfridge Field

Lt. (jg) Douglass P. Johnson det. Aircf. Sqdns., Sctg. Flt., to Nav. Acad.

Lt. Daniel W. Tomlinson det. Nav. Acad., to Aicraft Sqds., Battle Flt.

Marine Air Orders

Capt. Louis M. Bourne, U.S.M.C., det. Quantico and detailed to A. S. Tact. Sch., Langley Field

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A few recommended students will be given employment in our shops, while learning to fly.

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Oldest aeronautic establishment in U. S.
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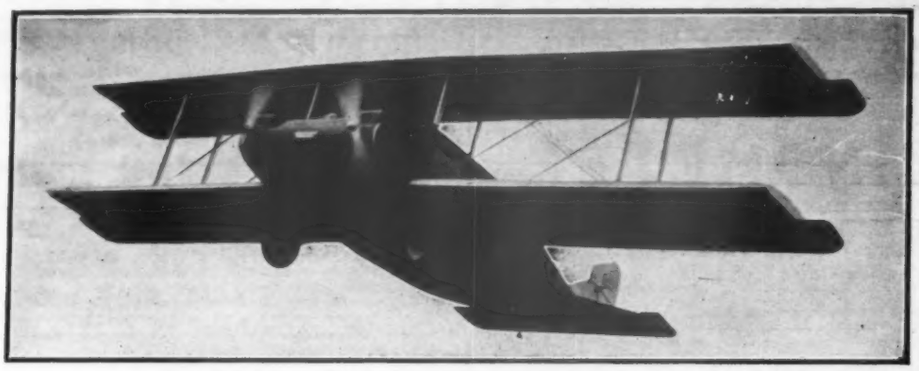

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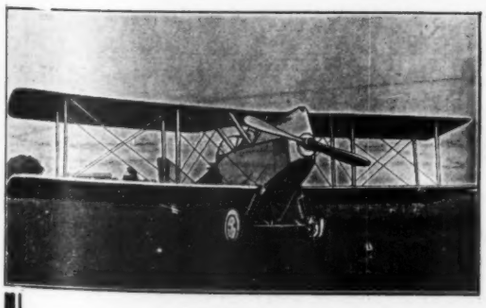

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INDEX TO ADVERTISERS

A

Advance Aircraft Co. ... 397
Aero Supply Mfg. Co., Inc. ... 404
Aeroplane, The ... 404
Aircraft Development Co. ... 401
Aircraft Service Directory ... 407 - 408
Aircraft Supply Co. ... 408
Aircraft Year Book ... 405
Alexander Aircraft Co. ... 409
Allen Auto Electric Service ... 408
Anderson Aircraft Manufacturing Co. ... 407
Auto Engine Works ... 407

C

Carpenter, Ford A. ... 408
Chamberlin Aircraft ... 407
Classified Advertising ... 410
Curtiss Aeroplane & Motor Corp. ... 378

D

Decatur Aircraft Co. ... 408
De Luxe Air Service, Inc. ... 409

E

Elias & Bro., Inc., G. ... 402

G

Guggenheim School of Aeronautics, Daniel ... 408

H

Hamilton Aero Mfg. Co. ... 407
Haskelite Mfg. Co. ... 408
Huff Daland Aero Corp. ... 407

I

Ireland, G. S. ... 402 - 407

J

Johnson Airplane & Supply Co. ... 400 - 407
Johnson Motor Products Co. ... 408

L

Lamblin, Etablissements ... 409
Ludington Exhibition Co., Inc. ... 408

M

Martin, Glenn L., Co., The ... 380
Monumental Aircraft Co. ... 408

N

Northrop, Marvin A. ... 407
Nicholas-Beazley Airplane Co. ... 399

O

Ostergaard Aircraft Works ... 407

P

Partridge, Inc. ... 407
Peck, Allen E. ... 407
Perry-Austen Mfg. Co. ... 409
Pioneer Instrument Co. ... 403 - 407

R

Remington-Burnelli Aircraft Corpn. ... 406
Robertson Aircraft Corporation ... 398

S

Scintilla Magneto Corp. ... 379
Southern Airways, Inc. ... 407
Spalding Construction Co. ... 408
Summerill Tubing Co. ... 409
Swallow Airplane Mfg. Co., The ... 401

T

Tempe Aircraft ... 408
Titannine, Inc. ... 409

W

Wallace Aero Co. ... 408
Warner, Edward P. ... 408
Where to Fly ... 405
Wood Elastic Web Co., J. W. ... 409
Woodson Engineering Co. ... 406
Wright Aeronautical Corp. ... 412

Y

Yackey Aircraft Co. ... 408

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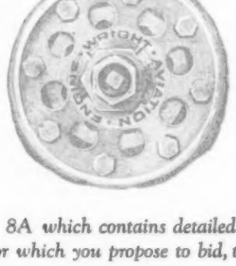

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The air cooled Whirlwind engines are better for extreme hot weather flying. Many instances are on record when these air cooled in extremely hot weather were flying perfectly when water cooled could not fly because of boiling. In winter draining radiators, heating water, heated hangars are all obviated by the air cooled.

WARRANTY GUARANTEE

A rigid 90 day "new car warranty" goes with each of these commercial Whirlwind engines. This warranty when backed by a responsible company is a great measure of protection to commercial operators. This warranty has been and will be administered to give real protection.

Service to Customers

We assist our customers in servicing and learning their Whirlwind engines. If they have troubles we send our service men to learn the cause and correct it. This safeguards the purchaser and helps us continue the dependability development of these Whirlwinds. We keep three service men on the road instructing and assisting. When more are needed we will get them. Spare parts are readily obtainable.

With Whirlwind engines your problems are our problems. The Wright Co. can only grow as aviation grows. We will be as earnest a worker for the success of your line as you will be, for *your success is our success.* The advantage of using new engines, made by a strong company strengthened by an unbroken chain of 22 years' experience and which is working to make the Air Mail a National Success will be appreciated by all Air Mail Bidders.

AIR MAIL BIDDERS:—*Write for Bulletin 8A which contains detailed specifications, power curves and full data for these* ***Whirlwind J4 Engines.*** *State the route for which you propose to bid, the probable number of planes you will use, etc.*

WRIGHT AERONAUTICAL CORPORATION, PATERSON, N. J.